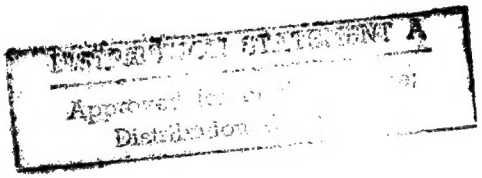
JPRS-ELS-87-019

7 APRIL 1987

Europe/Latin America Report

SCIENCE AND TECHNOLOGY



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EUROPE/LATIN AMERICA REPORT

SCIENCE AND TECHNOLOGY

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BRIEFS

SIEMENS CERAMICS RESEARCH--Siemens is currently continuing research on piezoelectric ceramics. The applications targeted are printer drives, ultrasonic antennas for medical diagnostics equipment, position sensors for control rods in nuclear reactors, overvoltage varistors, etc. Longer-term research involves multilayer structures for electronics applications and catalysers for the chemical inudstry (e.g., to eliminate nitrogen oxides in the exhausts of thermal power stations). Siemens is cooperating primiarly with the universities of Erlangen, Munich, Regensburg (crystallography), and Linz (manufacture of ultrathin structures using lasers). [Text] [Paris L'USINE NOUVELLE in French 5 Feb 86 p 164] /9835

CSO: 3698/A122

LARGE SCALE SATELLITE SIMULATOR AT EUROPEAN SPACE CENTER

Paris LE MONDE in French 21 Jan 87 p 19

[Article by Jean-Francois Augereau: "Satellite Testing Bank"; first paragraph is LE MONDE's introduction]

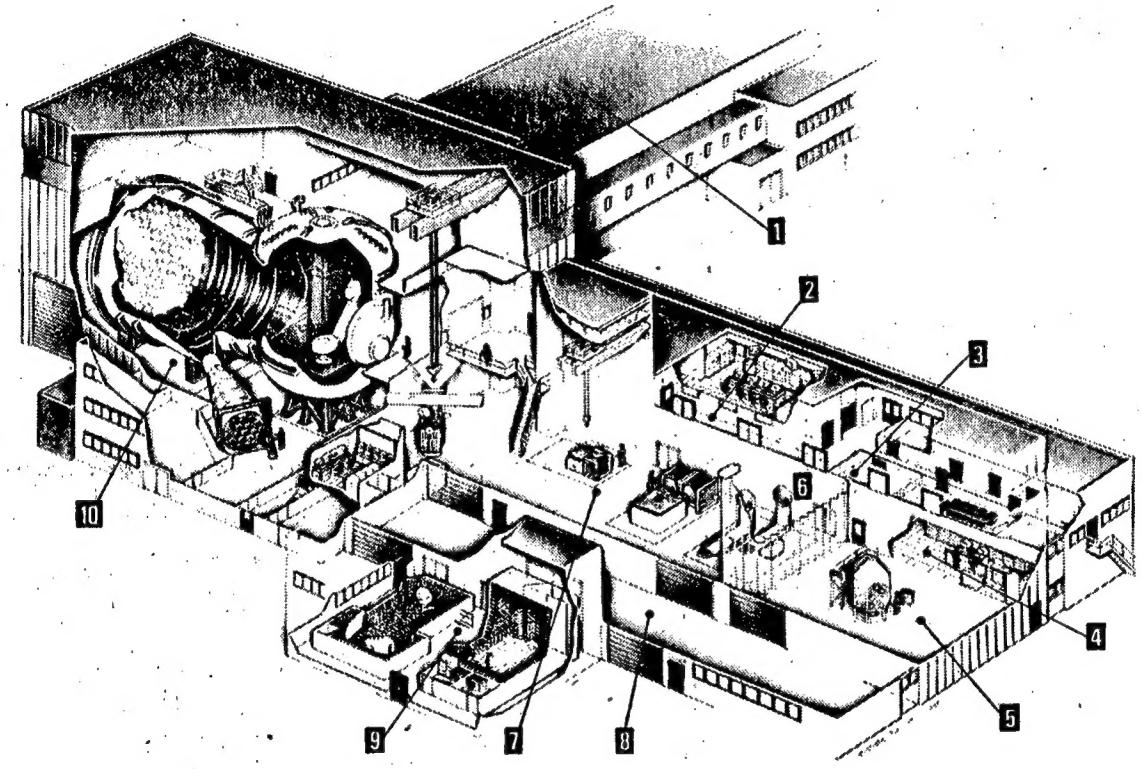
[Excerpts] Spatial simulators to test the satellites before their launching. At Noordwijk, the most brilliant artificial sun in the world.

An automobile manufacturer would never think of offering its customers a model that has not been exposed to the cold of the far north, the African sun, or the rain and fog of the British Isles. What is true for automobiles also applies to satellites. However, one can imagine all the technical and financial difficulties incurred in the testing of such an item under real conditions. That is why some space programs have designed large hermetically-sealed rooms where the extreme conditions to which are subjected satellites at the time of launching and during their stay in space can be simulated either separately or simultaneously.

It is in these complex facilities that most of the European satellites ranging from the Meteosat meteorological satellite to the Spot Earth observation satellite and the Eutelsat European telecommunications satellite, have been given the works. After 6 months of testing they reveal their capabilities, weaknesses, and strengths for a modest cost representing only 5 to 10 percent of the total cost of the project. But what was still possible with most of the payloads that are put into orbit by the present models of the Ariane launcher--weighing in at around 900 kilograms--will no longer be so with the more than 2-ton satellites that the European rocket will carry in its heavy version (Ariane IV) or super heavy version (Ariane V).

On the basis of these considerations the European space program decided 3 years ago to equip itself with a Large-Scale Simulator (LSS) to avoid having to test its heaviest and most voluminous payloads in the United States. The LSS, which was dedicated in Noordwijk on Wednesday 14 January by Doctor Rudolf W. de Korte, the Dutch Vice Prime Minister and Minister of Economic Affairs, required a financial commitment of 22 million units of account (about 150 million francs) by the member states of the ESA [European Space Agency] It consists of a 2,150-cubic meter room constructed from a 15-meter high vertical cylinder having a 10-meter diameter; to this was joined another horizontal cylinder 11.5 meters in diameter and almost 15 meters long.

In this enclosure, in which the items to be tested are placed on a rotating platform, it is possible to recreate the pressure, heat, and cold conditions encountered by a satellite in the course of its existence, and to conduct certain mechanical tests on the opening of large structures. As for the vibration tests, these can be performed in another part of the ESTEC [European Space Technology Center] center. Thus, in the enclosure it is possible to obtain a pressure of less than 1 millionth of the atomospheric pressure while varying the temperature from -196°C to +100°C.



When the satellites are delivered to the ESTEC center they enter the building through a lock chamber (8). They are then sent to a room (5) where they are prepared before undergoing certain tests: mechanical and vibration testing (6 and 7), electromagnetic and antenna tests (9), and exposure to the solar radiation and vacuum found in space in the LSS (10). For the smaller payloads the operations are conducted in other rooms (1). All the measurements gathered are then sent to a series of rooms (2, 3 and 4) where they are analyzed.

The latter possibility offered by the LSS is somewhat the key to the facility. Indeed, the Europeans have succeeded in recreating an artificial sun which they deem "is the most advanced in the world." The unit consists of 19 modules equipped with 20-kilowatt xenon lamps whose light is directed toward a large mirror measuring more than 7 meters in diameter; the mirror then heats the satellite with its radiation. More than 1400 watts per square meter. A real sun covering one part of the satellite while the other is left in the cold. The satellite is therefore bombarded with infrared and visible radiation, and the reactions are measured immediately.

The clients of this new facility are not lacking. The first candidates are the Italians with their IRIS space system which will be taken aboard the American space shuttle; testing should be completed by the end of spring. Next, the large solar panels which produce the electrical energy necessary for space vessels--the autonomous Eureca experimentation platform--will be tested. After that will come the Hipparcos astronomy satellite, whose purpose is to produce a mapping of the sky; and the Earth observation satellite ERS-1 before tests are conducted on some of the components in the living module that will be incorporated into the permanent space station which the Americans plan to launch in the middle of the 90's.

13312/9869
CSO: 3698/245

FRG'S SURVEY COMMISSION RULES ON GENETIC ENGINEERING

Specific Organisms Studied

Frankfurt/Main FRANKFURTER ALLGEMEINE ZEITUNG in German 4 Feb 87 pp 29-30

[Article by Reinhard Wandtner: "Safety Requirements of Genetic Engineering: Recommendations by the Survey Commission: Microbes with Foreign Genotypes May Not Be Released"]

[Excerpts] The "Chances and Risks of Genetic Engineering" inquiry commission presented its final report in January. The commission, set up by the German Bundestag at the request of the SPD and the Greens in June 1984, was made up of 17 members. Besides the 10 representatives of the four parties--the Greens added a special statement to the report--the group included experts from research, science and labor. The chairman was Wolf-Michael Catenhusen (SPD). The commission's report, a comprehensive document on the state, perspectives and dangers of genetic engineering, is of interest not only to politicians and scientists. The following summarizes the risks that genetic engineering entails for humans and for the environment, according to the commission. In the next issues of our "Science and Nature" supplement, we will present more reports on the work and recommendations of the inquiry commission. (The complete report of the "Chances and Risks of Genetic Engineering" inquiry commission, which is more than 400 pages long, was published by Schweitzer-Verlag, Munich, and is available in bookstores for DM 24.80.)

Official guidelines for genetic engineering have been in existence in the FRG since 1978. The "Guidelines for Protection Against the Dangers of In Vitro Recombinant Nucleic Acids" introduced by the federal government have been revised many times since. The fifth revision was submitted in May 1986. Because of rapid scientific developments and the first steps of economic applications, the changes proved to be unavoidable. Nevertheless, these guidelines are binding only for the research and development projects supported by the federal government. The guidelines state that it would be a welcome development if industry and other institutions were to comply with them voluntarily.

The survey commission now points out that no unforeseeable dangers have emerged from the approximately 10 years of fundamental research. During previous discussions of safety, questions were often raised concerning whether

dangerous pathogens could result from harmless organisms and genes commonly in use in laboratories through recombination. This can now be answered in the negative with a high degree of certainty. If there were risks, it is highly probable that they would have been recognized by now, amidst the countless gene transmissions that have been carried out. However, one cannot rule out the possibility that unexpected dangers will turn up in dealing with lesser-known organisms, genes and gene carriers. Even if this is unlikely, there is a residual biological risk.

Trained Personnel Needed

In order to keep this residual risk as small as possible, the commission feels that the safety guidelines should be reexamined, and if necessary implemented in greater detail or supplemented. This applies in particular to work with cells from multicellular organisms, retroviruses and oncogenes, as well as to cellular fusion and research dealing with hybrid cells. Not only the professionals must be highly qualified for their work; other lab employees, such as the cleaning staff or the skilled workers, must also meet certain requirements established on a graduated basis. It is also considered important that the safety measures be applied not only during the genetic engineering experiments, but also during the reprocessing of the material and of the nutrient solutions--during centrifuge and decanting, for example--as well as during the disposal of these materials. It is insistently pointed out that good technical equipment cannot replace the practice and training of the personnel.

With respect to handling microorganisms in particular, the commission recommends that the Bundestag ask the government for various measures. Thus, the Central Commission for Biological Safety in Berlin should examine whether high safety requirements should be established in the cloning (identical duplication) of oncogenes and other genes that control the growth and development of cells. Oncogenes exist in nearly every organism. They promote the growth of tumors when they are activated. They are present in this state in the genotype of certain viruses, so-called retroviruses. In general, tumor growth is induced only when various oncogenes are simultaneously active. A tightening of precautions is called for in dealing with certain retroviruses, as well as in experiments in which an attempt is being made to expand the host range of these viruses to humans.

Risk from Oncogenes

It is the commission's view that there will probably be no further danger from permitted microorganisms that carry oncogenes. Evidence to the effect that microorganisms altered by genetic engineering can transmit their genotypes to human cells has yet to emerge. This is apparently due to the fact that there are no so-called helper viruses in human cells. Without them, the foreign retroviruses cannot multiply. Oncogenes could be dangerous if they were to be injected directly into cells in large quantities. Because of the large amount of research involving oncogenes, however, it is advisable that more extensive attention be given to a possible threat to human health. It is conceivable that protein products from activated oncogenes could turn out to be pathogenic.

The commission also dealt with so-called new isolates obtained from soil samples. Because of their often unusual properties, they are of interest to genetic engineering. On the other hand, research on them has not been as extensive as it has been on the standard lab strains. If genetic engineering projects are being planned for these new microbes, there must be guarantees that they can be classified according to the safety guidelines. The commission calls for a central office, at the Federal Health Office or the Paul-Ehrlich-Institut, for example, that will develop and implement methods for testing the pathogenicity of microorganisms. In addition, the list of classified microorganisms must be added to and published on a regular basis.

The proper handling of the cell cultures of multicellular life, especially of mammals, should be imparted through training in microbiology, according to the commission. An appropriate educational background must be indispensable for genetic engineering work using such cultures. The Central Commission for Biological Safety should check into whether adequate precautions are always being taken in dealing with cell cultures.

Only part of the safety requirements applicable to lab work are transferrable to industrial applications of genetic engineering. Thus, the so-called "scale-up," the shift from the lab vessel (no more than 10 liters) to the bioreactor with a capacity of perhaps 10,000 liters, imposes new qualitative demands. The commission dealt with the safety questions--work safety in industrial genetic engineering--in great detail. Among other things, it calls for establishing safety guidelines, which have thus far not been legally binding, for all genetic research facilities and for the corresponding production sites. The commission admits that the 10-liter limit is inadequate for distinguishing between lab operations and production. Even at the lowest level of technical safety, production must see to it that as little as possible of the living organisms altered by genetic engineering gets into the environment.

The deliberate release of organisms altered by genetic engineering will increase in importance for agriculture in the future. Some of the research that is being carried out is on viruses and virus-like structures that are intended to help make plants resistent to insects, disease and herbicides. While many researchers believe that genetically altered organisms in general do not represent any danger to the ecological balance (there are some 3,000 types of microorganisms in the soil), others feel that serious damage to nature cannot be ruled out, despite the low survival rates that can be assumed. The fact that bacteria, once released, can under some circumstances never be eliminated from the environment is still seen today in the contamination of a Scottish island with anthrax pathogens. These microbes were released there in 1941, during a military test.

Up to now, there has been very little experience with "benign" organisms altered by genetic engineering. Large-scale release experiments, such as the one with so-called frost protection bacteria in the United States, have always fallen through because of protests. The survey commission thus recommends that the deliberate release of microorganisms with foreign genotypes continue to be prohibited in the safety guidelines. A decision should be made on the

justifiability of this measure in 5 years. Until then, the Federal Ministry for Research and Technology should commission systematic studies of the potential danger of such organisms. Industry, labor and environmental protection groups should also participate in the evaluation.

If large quantities of microorganisms should happen to be released that have not been altered by a process of genetic engineering, or in which genes were removed but not added back, it is necessary that this be reported. Provisions concerning this should be included in the safety guidelines. In the view of the commission, microbes that are pathogenic or poisonous for man and for working animals should in principle not be released into the environment.

Medical Aspect Discussed

Munich SUEDDEUTSCHE ZEITUNG in German 20 Jan 87 p 9

[Article by Stephan Wehowsky: "Final Report by the 'Chances and Risks of Genetic Engineering' Survey Commission: Artificial Nature With Residual Risk: Critics Fear That the New Methods Will Create More Problems Than They Solve"; first four paragraphs are introduction]

[Text] The "Chances and Risks of Genetic Engineering" survey commission was set up by the German Bundestag at the request of the SPD and Green caucuses in June 1984. The commission consists of nine members of the Bundestag: four from the CDU/CSU, three from the SPD and one each from the FDP and the Greens. In addition, eight experts who are not members of the Bundestag or of the government were appointed. The chairman is Representative Wolf-Michael Catenhusen of the SPD caucus, and the vice chairman is Hanna Neumeister of the CDU caucus.

The commission's task was to present a report by 31 December 1986 containing information on the state of research in genetic engineering, and thus in the related field of biotechnology, analyzing conflicts between the constitutional guarantee of freedom in research and other fundamental rights, providing criteria and limits for applications and making recommendations for the stimulation of research.

There were 18 commission hearings, of which four were public. Findings were gathered and discussed at 55 commission meetings. Several commission members went on fact-finding trips to Japan and the United States.

The commission report was adopted against the vote of the Greens, who issued a special statement. The report, together with the special statement by the Greens, is available as Volume 12 in the series "Genetic Engineering: Chances and Risks," J. Schweitzer Verlag, Munich.

The relative constancy of nature in the domain of the living, its comparatively slow development in accordance with strict laws, can now be manipulated with the help of genetic engineering, such that all "natural" limits can be exceeded. Apart from the question of how nature will react to such intervention, the problem arises concerning the effects of changes of such a far-reaching nature on human society. Will there not be a few experts

who, like priests, will hold sway over a majority, and is it not possible that the nature of man himself will change? This question is all the more insistent as it is being asked at a time when work is already under way throughout the world on genetic engineering methods. Is it not too late for reflections, for warnings?

The "Chances and Risks of Genetic Engineering" survey commission, established in 1984 by the German Bundestag at the request of the Greens and the SPD, attempted in more than 2 years of work to weigh out the potential risks and the promised benefits of all fields of application of genetic engineering. The report, which covers more than 400 pages, documents this effort--and depicts at the same time a horror scenario. Because the information gathered, examined and evaluated there indicates a complete change in society, even if this has been scarcely noticeable thus far, and even if the commission is very cautious in its statements concerning these consequences.

It is precisely on this point that the fundamental criticism of the Greens, who were, after all, one of the initiators of the commission, comes into the picture. It is their view that the attempt to formulate restrictive conditions for a technology of this scope is doomed to failure because once the genie is out of the bottle, all good intentions are too late. Thus, they would have preferred that the commission issue warnings to the public, present alternatives and otherwise come out in favor of rigorous prohibitions. The Greens were consistently motivated by their effort to keep nature from being placed entirely at man's disposal, and by their mistrust of industry, with its large-scale technology.

However, the majority of the commission members took a different course. In taking on a scientific analysis of the chances and risks of genetic engineering, the commission not only adopted the methods and categories of the biosciences and of medicine, but also applied arguments with micro- and macroeconomic orientations from experts in the respective fields. The background to this is the understanding that the FRG, with its complex international ties, is not independent in decisions of large economic scope. Consequently, nature is not viewed primarily as a value in and of itself; it is regarded from the point of view of its usefulness.

This fundamental agreement on man's disposal rights over nature also characterized the findings of the commission in the formulation of restrictions. Under these circumstances, it is no small wonder that in dealing with the subject of manipulation of humans, controversial positions were taken within the commission itself, while limits were established only where human dignity and his right to self-determination are not merely jeopardized, but conspicuously violated.

The balancing out of economic interests with the protection of nature and of man against practically unlimited access was made even more difficult by the fact that the "value" of medical and technical progress and of economic expansion was tacitly elevated to the status of an ethical postulate. According to the commission's report, the issue of what constitutes technological and economic progress and under what conditions it should be regarded as culturally and ethically significant was not discussed.

This explains all sorts of inconsistencies. Thus, the report states that modern hog breeding causes a not insignificant amount of stress among the animals, because they live in such close quarters, "in unappealing surroundings," that manure and feed can no longer be kept apart. Using genetic engineering, it is hoped that the qualities of the wild pig can be linked with those of the domesticated pig, so that in the future more stabile animals not only will survive the dreadful conditions of mass livestock breeding, but will produce better-tasting meat at the same time. Direct reference is made to another benefit: The "European Agreement on the Protection of Animals in Agricultural Livestock Breeding" stipulates that each animal must be kept with its own kind. The formulation of new animals could potentially "even result in an improvement in the situation of the animals," without it being necessary to change this position.

Even if it is noted at the same time that it might be sensible to change the methods of animal breeding itself, this example nevertheless shows in a drastic way that the main question is optimization of use. And the commission also states explicitly: "Man may in principle use animals for his purposes. Nevertheless, his conduct in this question must be responsible." In what way and according to what standards this is to take place remains unspoken; instead attention is devoted to the formulation of patent law pertaining to living creatures, which already exists in the United States.

In what is clearly the stickiest issue of genetic engineering, at least a partial answer is given to the question of the criteria for evaluation and responsibility: Specifically, the issue of whether intervention in human germ tracts should be permitted in order to treat hereditary illnesses. Some of the members of the commission were of the view that this interference in the human genetic makeup would not serve the purposes of human breeding because the standard used is one of a state of perfect health. Genetic engineering should thus serve to make good any mistakes made by nature. Aside from the fact that a large amount of rejects would probably be produced artificially--the commission makes direct note of this, and the majority rejects germ tract therapy for this and other reasons--this point shows that two standards are being applied here. For humans, the standard of health is to be applied, for nature the standard of utilization. Whether the discussion concerns the artificial manufacture of microorganisms that can destroy synthetic materials or other environmentally harmful waste products, or the use of medicine to increase the milk production of cows to such an extent that the farmers will have to have at their disposal "efficient management" in order to master this production method--the idea of utilization is always the focal point. The only question raised is whether harmful effects on the environment could ultimately jeopardize humans.

However, it is also true that biology acknowledges that man has more in common with the animals than religious book-learning had ever let him imagine. In principle, the germ cells that are manipulated by genetic engineering are the same in humans and in animals. If, however, the purely exploitative point of view is to be applied to the animal domain, then it will be very difficult to measure man by higher standards, and in a complex, industrial society, he is always in part regarded in terms of performance--and thus usefulness.

According to the constitution, the dignity of man is inviolable, but the drawback is that dignity is not visible. In contrast, performance can be measured--and increased. To this extent, it is a problem-free criterion, because it can be comprehended. The issue does become difficult, however, when performance cannot be increased to the necessary degree, and people are thus forced to fear for their jobs, people who are perhaps handicapped, who need special consideration or even help. If this situation cannot be changed, if medicine is stumped by it, then all that is left is the fact that every person has dignity that cannot be taken from him.

Again and again, the commission admits--sometimes between the lines--that genetic engineering has the fatal quality of discriminating wherever it cannot or can no longer have a positive effect on performance. This is apparent in three areas in particular:

--In the area of industrial medicine, diagnostic methods of genetic engineering could result in workers losing their jobs, either because they are not up to the particular burdens--such as exposure to chemicals--of the job or because the company doctor gives an unfavorable diagnosis with respect to future health.

--In the area of prenatal diagnostics, it will be easier to determine whether children are suffering from certain diseases, and thus whether they will be considered by the parents--and by society--as a burden, such that termination of the pregnancy will be required.

--Not least discriminating of all is the fact that special predisposition to serious illnesses can be elucidated, so that it is possible to indicate those that in the future will certainly break out. Thus, the affected parties are burdened with the future, while still in the present.

In all three areas, the commission dealt with the issue of how to harmonize the use of far-reaching diagnostic opportunities with the discrimination resulting for the individual on the one hand, and the possibility that his dignity will be violated on the other hand. The question of consent in experiments played as much a role in this as the problem of protecting information and of self-determination. Because the power of knowledge is in many regards threatening: How do the more powerful deal with their knowledge of their underlings, what do parents do with knowledge about their unborn children, and how does the individual approach his knowledge about his fate in life?

The recommendations that protection of information be given more attention, that consent to experiments be made obligatory, or even the appeal that handicapped children be accepted, seem helpless amidst the avalanche of new problems unleashed by this Faustian knowledge. The worst outgrowths of discriminating consequences of genetic engineering diagnostics should be avoided by keeping the newly-gained knowledge under lock and key, at least in certain areas. The awkwardness of this solution is obvious: There is no consensus about what is desirable. Thus, the chairman of the commission, Wolf-Michael Catenhusen, also noted in a special statements that the "apparent

indigenous nature" of genetic engineering must be brought up for discussion on a broad societal basis.

It is no wonder that the Greens continue in principle to say no to all these questions. And yet, even their position is not that convincing: "Health care for the Greens is not a general, prognostic genetic analysis in order to identify individual risks of disease, but rather the minimization of risks that could result in disease, for everyone." Thus, while the genetic propagandists want to set new diagnoses and resistances against a harmful environment that has itself already been damaged, the Greens hope for better health through a restoration of the environment through "natural" means. It is, however, doubtful whether those who are sick at this very moment are consoled by this hope for a better environment. Thanks to genetic engineering, the wishes of these people for individual health can in part be granted, as in the case of insulin for diabetics. Is genetic engineering thus not in fact the more realistic concept?

The Greens object that the damage to nature and to man that has been caused by the thoughtless application of science and technology should now be compensated for by renewed and even more far-reaching manipulation. The path once set out upon is being continued, this concept continues, even though rethinking and change are necessary. Man wants, in a very short time, to undertake changes in the realm of the living for which nature would need very large periods of time. This, however, creates new risks, because the ability of the environment to sustain new life forms cannot be tested adequately, the Greens conclude.

The commission's approach to questions of safety was very complex. It said that even though the fears expressed in the United States in the mid-1960s had not proven true, there remains a "biological residual risk," despite all safety precautions. And this risk is dealt with like any other "residual risk": it is balanced out against the expected usefulness of the new technology. Moreover, legal experts are examining issues of liability. Thus, the commission recommends the introduction of "absolute liability," so that injured parties are not forced to prove fault. Absolute liability is common in transportation systems and large technological facilities, such as nuclear power plants.

The work of the survey commission makes it very clear that, regardless of what uses genetic engineering will bring, it will certainly bring with it a wealth of new problems. These must be solved within the framework of societal decision-making processes. One limit to the freedom of research--vigorously called for by several members of the commission--should in fact be the point at which this research presents society with more questions than it can answer.

Agricultural Applications Assessed

Hamburg DIE ZEIT in German 23 Jan 87 p 33

[Text] For the first time anywhere in the world, a parliamentary committee has conducted a comprehensive assessment of genetic engineering, including

recommendations. The "Chances and Risks of Genetic Engineering" inquiry commission consisted of delegates from the CDU/CSU (4), SPD (3), FDP and the Greens (1 each), as well as eight experts. While all the members agreed to one joint, supportive position, the Greens issued a special statement. DIE ZEIT presents both viewpoints.

Plants and Animals

Genetic engineering supposedly offers "the opportunity to assure food production, greater economic feasibility of agricultural production and environmentally safe agriculture." For this reason, the commission welcomes "in principle the application of genetic engineering to plant production." Any negative effects on the environment are to be avoided, it said.

In contrast, it "rejects the production of herbicide-resistant plants using genetic engineering," if this promotes the use of herbicides "that are considered ecologically and toxicologically objectionable." Worthy of support are "genetic engineering applications in the area of breeding resistance to disease-causing agents and pests, the goal being to reduce the burden on the environment of agrochemicals," as well as the establishment of genetic banks.

The use of newly-developed raw materials can, according to the report, be expanded, and could "contribute to a solution of the structural problems in agriculture. Thus, in addition to correspondingly intensified support for research, "a temporally limited subsidization of the sale of optimal new-generation plants," accompanied by the gradual elimination of other agricultural subsidies, is to be recommended.

The majority "has no objections to the application of genetic engineering methods to animal production. One goal in this country is to improve quality, of meat for example, or to increase the animals' resistance to disease. An increase in quantity for animal production in the Third World resulting from genetic engineering is also favored.

The commission recommends that the "use of transgene animals in biological and medical fundamental research be supported" (transgene animals are carriers of foreign genotypes introduced using genetic engineering, whereby breeders promise improvements in quality, such as less stressed pigs). The increased use of intrinsic agents in animal production, such as the use of growth hormones, must be preceded by "an exact analysis of residual behavior and of the effect on humans," regardless of whether the increased influx is from outside (drugs) or from inside (incorporation of relevant genes).

People

1. Health/Pharmaceuticals

The report said that genetic engineering offers "great opportunities in the area of pharmaceuticals," since it makes it possible to produce numerous new therapeutic drugs, vaccines and diagnostic aids, as well as "intrinsic agents that are currently available only in small quantities." A supplement to the Medicine Act, "concerning the testing and registration of medicines produced

by genetic engineering" is overdue. Experiments with neuropeptides (substances important to the nerve function) "should be done under involvement of an ethics commission."

In order to avoid serious incidents in the course of therapy, research into pharmacogenetics (which studies genetically-induced, differing reactions by patients to certain medication) should be supported. Ecogenetics, which examines the influence of hereditary factors on, for example, allergic reactions to natural and harmful substances, was also deemed particularly worthy of research.

2. Genotype Analyses

Prenatal

In the interest of the parents in question, the report stated, it is a welcome development that genetic engineering "increases the extent and the accuracy of prenatal diagnoses and extends the possibility of genetic counselling. The number of genetic counselling and diagnosis offices should be increased, and the qualifications of their staff members should be improved.

"The utilization of genetic counselling and prenatal diagnostics must remain a voluntary matter for the parents. There must be fundamental guarantees that the expanded opportunities for prenatal diagnostics do not result in 'eugenically' determined abortions." The possibility of terminating pregnancy should not be abused "in order to select children according to desired or undesired genetic properties." The consulting physician is to point out the right to life of the handicapped child. Action is to be "taken in good time against" a possible societal constraint that genetically defective embryos be aborted. The commission recommends "that prior to the end of the 12th week of pregnancy only those genetic data obtained from a prenatal diagnosis that indicate a serious, untreatable disease should be conveyed to the parents."

For Newborns

Mass examinations (screenings) of newborns in order to detect serious, early-appearing hereditary illnesses that are treatable constitute a "valuable extension of the instruments of preventative health policy," according to the commission. However, screenings for untreatable illnesses should not take place, because "the examined child loses the opportunity to live at least a few years, until the onset of the disease, in a natural environment, and grow up without the stigma of the looming genetic disaster." Data emerging from a screening are to be protected against misuse, and the freedom of the parents to decide about the screening is to be guaranteed.

For Workers

The general application of genetic analysis in mass screenings of workers is rejected in principle. Only in company medical care is genetic analysis favored, and then "only if discernible dangers of its misuse ... can be clearly averted by legally binding regulations." Aptitude examinations can only indicate the current health of the worker, while "genetic analysis and

other examinations that diagnose predisposition to disease and future diseases" are to be "excluded." Tests for the "genetically-determined sensitivity of a worker to substances in the workplace" may be used only "insofar as they are expressly permitted by legal regulations ... The registration of workers that are singularly sensitive and where applicable their exclusion from the workplace are only permissible if an improvement in the objective working conditions, which would suffice for the worker in question as well, is impossible." The individual risk of a "work-related" illness, which justifies exclusion from certain employment opportunities, must be "quite considerable" with respect to probable onset and seriousness of the threatening injury. And social insurance as established by law is to guarantee "that genetically-related sensitivities to substances in the workplace are not, in case of later loss, to be asserted against the worker."

For Insurance Policyholders

Genetic analyses for a prognosis of the future state of health of an insurance policyholder should neither be a prerequisite for an insurance agreement, nor should it serve the process of risk differentiation (determination of level of premiums). If the policyholder himself is aware of the results of such analyses, then "he should only have to reveal them if they indicate that an illness will occur soon or that prevention will be necessary. Uncertain prognoses or those concerning the distant future need not be revealed by the policyholder."

3. Intervention in the Genotype

The commission considers the transmission of genetic material in somatic cells (as opposed to the germ cells, the egg and the sperm) as a form of therapy that is in principle feasible. However, the preconditions are:

--permission from the Federal Health Office, after an assessment by the Central Commission for Biological Safety,

--additional counselling of the persons directly affected by the therapy (patient, close family members) by a doctor not involved in the research process and therapy test,

--the consent of the patient or his legal representative and of an ethics commission.

--the submission of a research and therapy plan containing alternative treatment options and a patient-specific risk-use formulation.

Intervention into the human germ tract is rejected, even as therapy experiments. "In particular, a misuse of genetic engineering for human breeding purposes is to be averted at an early stage." The commission recommends that intervention into human germ cells by genetic engineering be made punishable by law. However, with a certain restriction: "Insofar as these germ tracts are capable of subsequently developing into complete individuals."

There should also be a legal prohibition on the production of human clones, as well as the formation of chimera from human and animal embryos.

In research, binding guidelines should make sure "that genetic transfer into totipotent germ tract cells, for which development into complete individuals is not foreseen, ... is precluded."

Safety

The commission stated that genetic engineering has "made the use of biological materials safer in many areas," such as the use of pathogenic viruses in the production of vaccines. The existing "Guidelines for Protection Against the Dangers of In Vitro Recombinant Nucleic Acids" deals primarily with lab work and should be "revised" in terms of production. This is particularly true, the report said, with respect to genetic engineering work on retroviruses (which often serve to "smuggle" genetic material into other cells; the AIDS virus is a retrovirus), with oncogenes (carcinogenic genetic markers), cellular fusions and hybrid cells.

In principle, the majority feels that the "release of viruses altered by genetic engineering is to be prohibited in the safety guidelines." For the moment, one exception to this is the use of viruses in vaccines for human and veterinary medicine. There should also be a moratorium of 5 years on the release of microorganisms (bacteria, yeasts, etc.) into which genetically foreign genes have been introduced.

However, even the release of large quantities of microorganisms bred according to classical methods should be subject to a reporting and approval procedure in the future. The federal government is called upon to take action to see to it that the release of microorganisms and viruses worldwide be uniformly regulated. The same is true for the release of plants altered by genetic engineering. Such plants are to be checked for possible "toxic effects on humans and animals" and for "the extent to which an undesirable transmission of genes to other plant species can occur." The release of animals altered by genetic engineering is "only acceptable if the spread of the animals can be controlled." There is no objection to "the release of useful animals changed by genetic engineering that are essentially dependent on man."

Law and Liability

The commission said that the existing guidelines on protection from dangers caused by genetic engineering have in general proven their worth and should "be legally binding for all users of genetic engineering methods" (at present, only voluntary compliance has been promised by industry).

Because "a risk cannot be ruled out entirely ... in genetic engineering, ... absolute liability should apply to those processes and products of genetic engineering that require approval in keeping with the safety guidelines." In the case of accidents, or even catastrophes, the genetic engineers must prove their innocence in the course of legal proceedings. The introduction of compulsory insurance is thus foreseen--although with an unlimited "maximum liability."

In the view of the commission, "the existing criminal provisions are insufficient to protect third parties and the environment from damage that could be caused by the improper implementation of genetic engineering experiments." Thus, the commission went on, violations of the ban on experiments or of the safety guidelines should be made punishable.

12271
CSO: 3698/305

INITIAL SUCCESSES AT NEW FRG GENETIC CENTERS DESCRIBED

Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 442, 28 Oct 86 pp 4-5

[Text] The performance of scientific research work begun in 1984 in the genetic centers of Cologne, Heidelberg, and Munich has shown that the subsidy of "genetic centers" was the right way to go. This was emphasized by Federal Research Minister Riesenhuber during a discussion of the initial successes of these centers in the area of genetic engineering.

In 1986, the number of junior scientific staff at the genetic centers of Cologne, Heidelberg, and Munich exceeded 300, predominantly graduate students and PhD candidates. The development phase of the centers is largely concluded. Annual subsidies from the BMFT (Federal Ministry for Research and Technology) have reached a total of DM18 million. Industry participates with a total of DM3 million per year to which must be added various contributions from the respective state governments.

Research in molecular plant biology and cell biology, as conducted at the genetic center in Cologne, shows the full range of factors with which genetic engineering can contribute to progress in plant breeding. The scientists of the Cologne genetic center succeeded in regenerating plants of all the major varieties of cereals in any quantity desired, on the basis of in-vitro cultures (cell cultures) of cultivated plants (such as wheats, corn, rice, barley, and rye); these cultures are particularly important for the application of genetic engineering methods. They also successfully developed two new methods for the direct gene transfer in cereals.

Molecular interaction and signal transmission mechanisms among the cells of an organ or an organism are of special interest to the "Center for Molecular Biology in Heidelberg" (ZMBH). Among the great number of interesting preliminary research projects, the successful work to combat the hepatitis-B virus is of worldwide interest. Together with the results of other working groups, the scientists in Heidelberg succeeded in creating a vaccine that can be produced with genetic engineering methods. The vaccine probably will be the first of its kind which can be employed on a large scale and will open the way for a worldwide fight against the hepatitis-B disease.

Scientists at the genetic center in Munich are also concerned with immunological-biological questions at a molecular level. In this case, however, they are concerned with the investigation of the antibody structure in humans. Certain constellations of these antibodies are regarded as risk factors for specific rheumatic diseases. Also of great interest is the research work at the Munich genetic center on the genetic engineering production of proteins like insulin, as well as of hormones in bacteria and yeasts.

8617/6662
CSO: 3698/M071

DUTCH SCIENTISTS ON BIOTECH PROGRESS, COMMERCIAL APPLICATIONS

Amsterdam DE VOLKSKRANT in Dutch 3 Nov 86 p 2

[Article and interview with Leiden researchers Dr R. Schilperoort and Dr R. van der Meer, by Ineke Jungschleger: "Dutch Scientists Lead the Way: Biotechnology Growing Faster Than Business Can Keep Pace With"; first paragraph is introduction]

[Text] Biotechnology is as old as beer and yet still being widely developed. The use of bacteria and other micro-organisms as small factories for all sorts of products could provide Dutch industry with momentum in the coming years. The Netherlands is leading the way in scientific research, but is behind in the area of commercial applications. However, a small biotechnology industrial park has grown up in Leiden over the last 2 years. Ineke Jungschleger spoke with "the godfather of Dutch biotechnology," Prof Dr R. Schilperoort, and with Dr R. van der Meer, who is leaving academia for the business world on 1 January.

Leiden--The question of what biotechnology exactly is meets with all sorts of answers, based on U.S. and European government reports that are trying to define the field. For the purposes of this interview, Leiden professor R. Schilperoort prefers to stick to a recent Japanese study, a survey by MITI, the Japanese Ministry of International Trade and Industry.

"The Japanese are very good at providing timely evaluations of subjects that are of commercial interest. If they make a strong push for something, you have to watch out that you are not swept out of the market. It started with cameras, and then we saw it happen with chips and cars. The Japanese do not themselves do research, their strength is in implementation," Schilperoort says.

"Now that they appear to see a great deal in biotechnology, you can rest assured that developments in that field are advanced enough for it to be of commercial interest. MITI asked 662 companies about their vision of developments in the coming century. Of these companies, 20 to 25 percent put biotechnology at the very top of the list. Above robotics, above office automation, etc. That indicates the state of affairs."

[Question] What are the most important areas of application for biotechnology at present?

[Van der Meer] "Agriculture, horticulture, ornamental plants, the pharmaceuticals industry and, which not much is known about right now, the food sector.

"Agriculture has a lot of biological insecticides, in horticulture and ornamental plants tissue cultivation is on the rise. Generating plants through tissue cultivation instead of from seed. They are now using tissue cultivation in the United States to grow celery; the tissue is embedded in a gel matrix and then that is sown by the farmers. The small plants are made in very large bioreactors through fermentation. It is large-scale work and is more uniform than with seed, thus resulting in a much higher yield.

"Biotechnology was used at a very early stage in the duplication of orchids. It was inconceivable 20 years ago that it would be possible for you to buy a bouquet of orchids at the market. Orchids only grew in primeval forests. Through biotechnology it has become very possible to produce them cheaply.

"Applications in the area of health care will be sweeping. In both the diagnostic and the therapeutic area, developments in biotechnology will soon make it possible to do much more than was previously the case. Part of the progress that is being made is in cancer research. The biotechnological method is better than any other for determining the type of cancer when examining a tumor and for defining what exactly the patient has. This is now possible almost all the way to the level of the patient. It will come to that in the 1990s. The application of monoclone antibodies, through which the location of the cancer can be localized.

"The next step is that the substance that destroys the sick cells can be sent to that place, with the help of the monoclone antibodies. In this way, chemotherapy can be applied in a much more targeted way, and there is no longer the problem that the healthy cells are attacked as well.

"In chemotherapy, cancer research had gotten onto a track where very little that was new was expected, according to people in the pharmaceuticals industry. Biotechnology provides the opportunity to open up entirely new paths. A start is being made at making antibodies against certain types of cancer that can be applied therapeutically as well. This is a development of the last 10 years, and it is now beginning to dawn on people that there really is something new under the sun.

"The products in the area of medicine that come onto the market have a rather high added value, with which more research can be financed. It is expected that profits will be made in this area rather quickly. For this reason, there are already a number of start-ups in this market, small biotechnology firms."

[Question] You mean that it is rather easy for companies involved in the medical aspect of biotechnology to receive subsidies. This is true not only for newcomers but also for established companies. Gist Brocades received a hundred million guilders for research at the end of 1984.

[Van der Meer] "For that award, [the Ministry of] Economic Affairs set the condition that Gist Brocades open up new lines in research. If you want to use this type of innovation subsidy in order to expand existing research, you won't get the money. Of course, this closely monitored. As far as Gist Brocades is concerned, you might say that it has developed from what was previously an exclusively specialized pharmaceuticals company into a partial biotechnology firm.

"The new lines that are emerging there are supported by Economic Affairs. Other developments are simply continuing alongside these trends. It could be that they are doing one thing or another in enzyme technology and in yeast technology, and that they are coming up with new developments in antibiotics. This is all possible, but I don't know about that, because that has nothing to do with the hundred million from Economic Affairs."

[Question] Questions about this were raised at the end of September in the Standing Chamber Commission for Economic Affairs. Minister De Korte recently announced in a letter to the Second Chamber that he wanted to carry out sharp cutbacks in research support to large companies.

[Schilperoort] "There is not much criticism of the ground-breaking work that is being done with innovation subsidies. There, the government is quite enthusiastic. The Dekker Commission is advising on anticipating technology policy, but I think that there will continue to be a desire to solidly support companies so that they can open up new lines. What there is clearly no desire to do, and that is what Minister De Korte brought up last week, is to target individual companies."

[Question] Mr Van der Meer, you are leaving for the Hollandse Ontwikkelingsmaatschappij [Dutch Development Corporation]. Will you have many dealings there with innovation subsidies?

[Van der Meer] "That is very possible. I will be having contact, at least this is what I hope, with young companies in the area of biotechnology. The Hollandse Ontwikkelingsmaatschappij is trying to specialize in supporting such companies, helping them to get off the ground. This can be through seeking out capital, but it can also be through ourselves stepping in from time to time as interim manager. Most brand-new companies have a good technician, the guy with the idea, but are somewhat lacking in financial and organizational terms, and it is there that they can really slip up.

"The two founders of HOM--which, incidentally, has no ties with the government, it is a private company--have a background in finance and economics. We are going to spend time working on the interim management aspect in particular. However, they want to concentrate on biotechnology, medical technology and environmental technology. This is why they recruited me. What it will amount to is that I will give technical advice as well to companies that are just starting up."

[Question] Are you also going to establish ties between these young companies and universities?

[Van der Meer] "If it's up to me, yes. Up to now, I have tried to help get university projects in the area of biotechnology off the ground and to stimulate them in directions that are of interest to the business world. The biotechnology innovation program that we got off the ground is in fact intended to achieve a division of responsibilities between the research groups, to emphasize a number of priorities and, last but not least, to see to it that this is noted and picked up by the business world.

"The business world in this sense can be regarded in very broad terms. Horticulture, health care and environment can be included. We have research in the Netherlands, we have universities and colleges; let the kids do work where there is as little duplication as possible and where there is as much cooperation as possible. Not only between the universities, but also cooperation with companies and with consumption entities. That is the goal of the innovation program."

[Question] Unlike U.S. universities, Dutch universities do not advertise their scientific research programs. Traditionally, those two worlds are kept strictly separate here.

[Schilperoort] "You have to make a clear distinction between a couple of things. An essential element of this program is that the priorities are determined by asking industry what, in its opinion, is of interest in strategic research. The topics, processes and products. We have gone to talk with boards of directors, sometimes with books on those subjects in hand, to ask whether they wanted to get down to work on them. If they wanted to, we were able to provide support.

"One's own input is essential. At least 50 percent of the costs of the research must be paid by them. And they have to see to it that there is a good infrastructure. The best thing is if the companies do as much as possible themselves, since the program is not infinite. It runs out in May 1990, and by that point we have to have established something that can continue on its own."

[Van der Meer] "Cooperation has demonstrably emerged from this. Many projects can be pointed out that would not have come about if it were not for this program. The Biotechnology Program Bureau, where I will be working until 1 January, is well-established, and will be able to continue operating. I have the feeling that I have done my duty there, and that my further input must come from industry. I've worked at universities and institutes for 7 years. Now I am going to take a look at it from the other side. I really want to apply myself to helping maintain policy from that vantage point."

12271
CSO: 3698/296

ISRAELI RESEARCH IN HIGH-PROTEIN WHEAT

Milan BIOTEC in Italian Nov-Dec 86 pp 49-50

[Article by Massimo Crippa, PhD candidate at the Weizmann Institute, Rehovolt, Israel: "One cross, two crosses...a research to increase protein content of wheat"]

[Text] Wheat, flour, bread, pasta: for us Italians it is a daily reality taken for granted; what counts is the sauce. And if one overindulges on spaghetti, one can go on a diet. For others, instead, 'dieting' is a sad reality of everyday life-- a situation which they have come to accept with resignation.

This is a problem which teams of researchers all over the world have tackled for years. The problem is not only to increase grain production, but also to improve substantially its nutritive properties. And now the first results are coming in. Yoram, who shares an apartment with me, works at the Weizmann Institute at Rehovot, Israel, with the team headed by Prof Moshe Feldman. Usually, he's not very talkative, but one evening he couldn't contain his satisfaction: "We made it.", he exclaims, and he tells me a story of tetraploidy, hexaploidy, and of new wheat varieties of high protein content. "Man has grown wheat for more than 9000 years; the grown varieties are generally rich in carbohydrates and relatively poor in proteins. The problem has been to create new varieties of higher protein content."

Avraham Levy, who is also a student of professor Feldman, gives me additional details: "Today it's possible to enrich flour with protein (gluten) extracted from wheat grains. There are 'good' and 'bad' glutens; the first have high visco-elastic properties (they can be stretched like a rubber band before reaching the breaking point), the latter are almost rigid. Using the first

type, one can increase the flour protein content up to a maximum 12-13 percent by weight. Not much." Even if the genetic potential of wheat has been exploited to the point that it is now difficult to obtain 'useful' mutations, for a very long time selection has been conducted on the basis of a most common criterion of selection, that of 'quantity'. "Following this criterion, other useful characteristics were lost," continues Avi, "for example, both Triticum durum (from which comes flour for pasta), and Triticum aestivum (flour for bread) give high yields by hectare, but are relatively poor in protein. Experiments have been conducted to try to change directly the genetic properties of the species by means of chemical substances or radiation (for example, x-rays) with little positive results. Therefore, the problem has been again tackled by means of classical genetics: by creating a species of high protein content and cross it with the two aforementioned species so as to obtain a hybrid that would have the advantages of both parents."

Avi explains his point with a diagram: "There's a wild wheat variety called Triticum dicoccoides which has a high protein content relative to the durum and the aestivum, but is low yielding. Also the stalks are very fragile and don't keep erect. These two characteristics are more than sufficient to discourage a good cultivator from working with this plant for a selection. Instead, we have tried to insert the 'high protein' characteristic in the two most cultivated species."

Triticum dicoccoides is a tetraploid (in wheat the haploid total is seven chromosomes); to cross dicoccoides with durum is not difficult, because the latter is also tetraploid. The chromosomes are able to pair without problem, and to exchange information (recombination or crossing-over); on the other hand, Triticum aestivum is hexaploid and the pairing of its chromosomes with those of dicoccoides is unbalanced, with two sets of chromosomes from one side and three sets from the other-- a germinal cell, or gamete, always contains half of the chromosome total of any other type of cell of the organism-- therefore, to a tetraploid cell (4X) corresponds a germinal cell in which the gametes are diploid (2X).

Normally, crossing Triticum dicoccoides (2X) and Triticum aestivum (3X) yields pentaploid (5X) plants which have generally sterile pollen (male sterility). But it is possible to cross

these plants again, using the females, with one of the parent plants (a technique called back-cross), and obtain a progeny with a number of chromosomes varying from 35 to 42.

In the genomes of the durum and aestivum, defined as AABB for the first and AABBDD for the second, we can trace the AA to the AA genome of Triticum monococcum, a very ancient wild plant. The BB part of the genome has unclear origins because there is no trace of it in wild plants. Two hypotheses are put forth to explain the BB part: either the genome from which BB was derived has been lost during the various selection processes by man, or it was transmitted and in the process a tetraploid (Triticum dicoccoides) was created. Afterwards, inside this genome, BB was modified to the point of becoming unrecognizable. According to the researchers of the Weizmann Institute, if this is the case, the species that contains the genome closest to BB is Triticum searsii, a species discovered by Moshe Feldman many years ago in Israel, and previously unknown (see the diagram from the Weizmann Institute which illustrates the origin of cultivated wheat).

As Moshe Feldman is about to leave for a sabbatical year, he gives me the latest information on the research. "The best wheat species cultivated in Israel has a yield of about seven ton per hectare and a protein content of 15 percent by weight. We have been able to obtain various wheat families with an increase in protein in the grain of 20 to 30 percent and of equal yield. But this is only the beginning. Field tests are now beginning: we have distributed seed to various experimental stations to check the effects of the environment and cultivation methods on the protein content and the yield. We think that these species utilize more efficiently the nitrogen fertilizers, and this may be the reason for higher protein content." He smiles and says: "We have also sent grain samples to Italy. The Barilla company is interested in our product, and has asked permission to conduct some tests on the flour obtained from these new wheat families. If all goes well, we will export seed to the Third World." I look at him perplexed; many Third World countries don't have diplomatic relations with Israel. "Don't worry; we'll find a way, maybe through third parties."

The last question I put to him, as an Italian overseas who longs for homeland cooking, concerns the quality of spaghetti obtained from the new types of flour. He laughs: "They will be better, believe me."

Photo Captions

Origin of cultivated wheat according to a diagram prepared at the Weizmann Institute. By selecting the most favorable characteristics, man has obtained high yielding wheat varieties with the desired characteristics. [p 49]

Pairing of chromosomes of Triticum dicoccoides and Triticum durum. Each round shape is formed by two V shaped chromosomes joined at their extremities. In the center are four united chromosomes. At the bottom are two sets of chromosomes joined only at one point. [p 50]

A T. searsii seedling. If the hypothesis that the BB genome was transmitted to T. dicoccoides and then modified, is true, then this species contains the most probable ancestor of this genome. [p 50]

CSO: 3698/267

BRIEFS

NEW ITALIAN BIOTECHNOLOGY ASSOCIATION--Within Federchimica a new association has been formed: ASSOBIOTEC, the national association for the development of biotechnology. Any company interested in biotechnology products and processes in Italy can join this association. Federchimica, which had already shown its interest in this new technology by publishing a study on "Biotechnology in Italy: an opportunity for industrial development", seeks to help out those companies that work or will work in this field, in solving technical, economic, and legal problems. This goal will be achieved by participating with the appropriate ministries to the formulation of national reseach and development programs; by preparing proposals favoring this type of new technology through financial and tax assistance, and which follow regulations to be issued for the production and marketing of substances resulting from biotechnology. The association will also concern itself with the development and execution of EC sponsored programs. [Text] [Milan BIOTEC in Italian Nov-Dec 86 p 54] 13120

NEW EC-SPONSORED BIOTECHNOLOGY PROGRAMS--The EC has made public the preliminary list of reseach contracts for the BAP (Biotechnology Action Programme) program. There are 172 contracts already agreed upon, and 69 contracts near settlement. For the 'contextual rules' subprogram the signed contracts are 37 (one Italian), while those near definition are 13. These are contracts for the study of data banks, for automatic DNA sequencers, for simulators of enzyme processes which utilize immobilized biocatalysts, for computer monitoring and control of biotechnology processes, for studying the feasibility of European centers for bacterial strains which contain plasmids, etc... For the second subprogram, which is divided into four areas, 28 contracts have already been signed (5 Italian) for enzyme engineering research and 14 others

are near settlement; 49 programs (5 Italian) of 'genetic engineering for plant cells', many of which deal with studies on wheat and nitrogen fixation, and include 15 other contract to be defined at a later time; 26 contracts (one Italian) are for research programs in genetic and cellular engineering pertaining to species of microorganisms important to industry, and the risks connected with the release of such species in the environment; finally, 32 contracts (4 Italian) have been awarded for programs of genetic engineering on animal cells, the construction of vaccines, and the study of proteins of medical interest, and another 11 contracts are near settlement. Also the EC is formulating the objectives of another program called BICEPS (Bio-computing: a program for European policy and collaboration). The bio-computing technologies are gaining importance in the realm of medical care and services, in medical research, in biological and biotechnology research and biomedical technology. Both the US and Japan have made large investments in this field and keep a close watch on the European market. Therefore, it is necessary that European technology in this field-- strong in some sectors-- achieve marketing capabilities as soon as possible. Additionally, joint European research projects should be promoted to tackle the more difficult problems. The purpose of the BICEPS program is to support this European need. [Text] [Milan BIOTEC in Italian Nov-Dec 86 p 54-55] 13120

CSO: 3698/267

FRG WANTS TO LIMIT AIRBUS SUBSIDIES

Frankfurt/Main FRANKFURTER ALLGEMEINE ZEITUNG in German 14 Jan 87 p 5

[Article: "Government and Bundestag Want to Limit Airbus Subsidies. Special Session of Economics Committee. Conflict Between CSU and FDP. Four Billion Marks Spent To Date"]

[Text] Bonn, 13 Jan (K.B.)--The federal government and the Bundestag want to prevent further increases in costs and subsidies related to Germany's involvement in the European Airbus program. Agreement on this point was reached by federal economics minister Bangemann, the aerospace coordinator, parliamentary state secretary Gruener, and deputies from the coalition and the SPD, in the absence of the Greens, at a special session of the Bundestag's economics committee. The FRG has spent more than DM 4 billion to date on the Airbus program. Although the financial situation of the Airbus Industrie group will become more difficult due to the lower exchange rate of the dollar, no one on the committee advocated halting production or not expanding the program with new medium- and long-range models. Limiting the subsidies was considered necessary not only for budgetary reasons but also out of concern that the subsidies could further endanger German-American economic relations.

In order that subsidies for Airbus no longer negatively effect relations between Washington and Bonn, the various parliamentary parties are urging that the German-American agreement on trade regarding commercial aircraft be renegotiated. This agreement was included as a supplementary protocol in the GATT (General Agreement on Tariffs and Trade). For this reason the FRG government does not consider Airbus subsidies to be in violation of the GATT. Bonn and Washington still do not agree, however, on whether the FRG government is also allowed to be involved in the financing of production and sales for the aircraft program in addition to the subsidies for development costs. The economics committee shares the view of the FRG government that American competitors of Airbus would also benefit from state assistance. The parliamentary parties applauded the fact that economics minister Bangemann had ordered an expert opinion which was intended to reconcile the subsidies for the aircraft industries.

Differences of opinion within the coalition concerning cost developments with regard to Airbus have not been resolved even after the special session of the economics committee. During the closed session Bangemann is supposed to have

said that on this question he agreed with CSU head Strauss, a promoter of Airbus. At the close of the session, however, FDP deputy Gruenbeck repeated his charges that Strauss was not being impartial in his supervisory duties regarding Airbus. He should, Gruenbeck said, give up his posts on the supervisory boards of Airbus Industrie and its German partner firm Messerschmitt-Boelkow-Blohm (MBB) so that controls could be improved. Airbus, he went on, should not remain forever a "subsidized state enterprise." SPD economic policy-maker Jens also demanded more stringent controls. Jens said that because there is disagreement between the CSU and the FDP and because the difficult financial situation at Deutsche Airbus GmbH was first made public as the result of indiscretions on the part of Strauss, the SPD members in parliament had called the special session in order to clarify the situation.

Jens called upon the economics minister to either realize the desired greater participation of private firms in Deutsche Airbus GmbH or to submit another plan following the Bundestag elections. Jens expressed doubt as to whether private capital in the billions could be obtained for the risks involved in the Airbus program. A Strauss letter to Bangemann referring to an impending inability to pay on the part of Deutsche Airbus GmbH had frightened away investors with private capital, said Gruenbeck. One CDU deputy, Wissmann, and one CSU deputy, Glos, promised to support the FRG government in its efforts to establish a new basis for financing Airbus and to urge reductions in Airbus production costs.

Jens denied the accusation that the SPD was endangering jobs in the Airbus industry with its criticism. The SPD's members in parliament, he said, viewed Airbus as a sensible project. Jens left no doubt concerning agreement by the SPD's members in parliament on development costs for new models. It must be ensured, he said, however, that the Airbus partners share the development and production costs in accordance with the cost-sharing schedule used up to now.

Gruenbeck said that the FRG government had spent, promised or budgeted approximately DM 11.5 billion to date. The development costs for the model A 300/310 and the A 320 had been subsidized with DM 3 billion; DM 598 million had been decided on or provided for in the budget for the planned A 330 and A 340 models--in addition to an estimated government subsidy of DM 2.9 billion for the new aircraft. DM 444 million, he said, had been paid out to finance sales; medium-term financial planning envisioned another DM 330 million.

12552
CSO: 3698/276

FRG DATABASE INDUSTRY PROFILED; SHORTCOMINGS NOTED

Frankfurt Main DIE UMSCHAU in German No 12, Dec 86 pp 622-624

[Article by Dr H.R. Simon, Society for Information and Documentation (GID) "The Federal Republic of Germany as a Country of Database Manufacturers"; first paragraph is DIE UMSCHAU introduction]

[Text] Electronic databases collect information from almost all areas of the humanities and natural sciences as well as from various areas of human activities. The number, scope and utilization of approximately 3,000 publicly accessible databases are so complex that detailed knowledge of databases could be referred to as a discipline of its own. Creating a systematic overview of databases is a sensible task from the economic point of view as well because it minimizes the cost and facilitates the selection of suitable databases for subsequent data acquisition.

Internationally oriented database lists can provide an initial overview of the global offering. Because of the broad contents of these lists the specific situation in individual countries is often inadequately described. This unsatisfactory informational situation has now been resolved by an appropriate special index for the FRG (1). These special lists normally also compile both updated analyses of the database business and "trend forecasts." Due to the unreliable sources mentioned above, the corresponding findings for individual countries are largely general and imprecise.

Because of this existing situation, a concise update especially for the FRG seems indeed very important to the newly appointed database manager of the Society for Information and Documentation (GID) (2). All conceivable (and often inconceivable) aspects are being examined. These reports fill column after column in the daily newspapers. Recently the study has been extended to information policy and the information industry.

Numerical data serve primarily to prove the thesis of a U.S. lead, for example: "In the United States, there are more than 2,000 database services (in Germany fewer than 100)"[3].

Here again the uncertain source situation must be mentioned: For the FRG reported about 200 databases (as of April 1986). It is impossible to estimate how many are not reported. As a percentage of the 3,000 databases reported internationally [4], the FRG produces about 6.6 percent of all databases and not, as is often reported, "only 2 to 3 percent"[5]. These "domestic products" of the FRG and West Berlin must now be presented with a little more precision. The main points of this overview are to examine the accessibility and availability of stored information and to provide a description of the "contents" of German databases, especially commercial databases.

For Which Branches or Special Disciplines Are Databases Produced in the FRG?

Fifty percent of the offerings of the roughly 178 databases listed in 1985 breaks down as follows:

Interdisciplinary databases	27
Social science databases	21
Chemistry databases	17
Economics databases	14
Health databases	13

The other fields covered may be found in Table 1. The table reveals: Categories 1-5 represent precisely 51.8 percent of domestic products, with an additional 4 areas bringing the total to 75 percent, with the remainder being distributed rather broadly over 11 areas.

The question remains: What are the reasons for this distribution? What is the commitment of industry and public institutions? The following series of questions attempts to give the broad outline of an answer:

Is Private Industry Holding Back as a Manufacturer of Databases?

This question must certainly be answered positively for 1985, the year under examination. Only about 28 percent of the examined databases are compiled by private industry. This low percentage is also true for specialized databases, that is, economic databases developed by private industry: Out of a total of 18 economic databases identified [6], only 3 are being developed by private industry. Further details are listed in Table 2, where, for increased clarity, only very comprehensive disciplines have been considered.

These facts describe a situation which, from the standpoint of information policy and industry planning, will certainly undergo major changes in the next few years. This is especially true for new types of economic databases which enable the direct use of information for import, export, and business relations[7].

What information can be offered by private industry to private industry? This question will be examined in the following section, which is limited to a description of the status quo.

Business Information--Economic Databases

An overview of the results of the FRG specialized information program for 1985-1988 for the economic database sector is presented in Table 3.

In contrast to the FRG, the United States has 226 trade databases, 141 databases with macroeconomic data, and 95 with stock market information. Overall, 719 economic databases are accessible in the United States, i.e., 40 times more than in the FRG. Among the West European countries, Great Britain offers the largest number of industry-related databases with 61 databases, and even in France there are 41 databases available(8).

These facts speak for themselves. One can assume that there is pent-up demand in our country that will certainly result soon in a flood of requests. It is hard to predict when it will take place and with what financial volume, but various circumstances (for example, the expansion of and level of interest in the INFOBASE 1986 database fair in Frankfurt) point to the beginning of rising interest. The above brief remarks regarding the international situation address again the area of domestic production. This will be dealt with briefly in the following section.

Comparison of Database Offerings: The FRG as a Producing Country

After division into large fields of specialization, striking discrepancies are seen in database production when an international comparison is made. The FRG is, so to speak, in a negative position regarding the production of economic databases. Domestic coverage of the remaining large fields ranges from good to very good.

Too little is still known by potential customers about information, data, and facts available from original databases in the FRG. This may also be due to the different access procedures for this information. The next series of questions will examine the existing possibilities.

How Can German Databases Be Accessed?

In order to make the information stored in database accessible and retrievable, a retrieval language or retrieval system is required.

A retrieval system is strictly defined as the total amount of software required for the search procedure in a database. A retrieval system is basically characterized by:

--dialog functions,
--search functions, and
--output functions(9).

An example would be GOLEM = Large scale memory, catalog structured organized search method).

Among the 178 databases listed in the "Directory of German Databases, Database Managers, and Information Exchange Agencies," 33 different retrieval languages are utilized, with some of the databases offered in several retrieval languages. The retrieval language or retrieval system GRIPS is used in 30.3 percent of German databases. It was developed by the German host DIMDI especially for applications in the area of biosciences and medicine, but is also widely used in the areas of technology and energy, physics, and mathematics. The other frequently used languages or systems are GOLEM (23 percent), and STAIRS (18 percent). The areas of civil engineering, social sciences and the humanities, and commercial information work frequently with GOLEM. STAIRS, on the other hand, is mostly used for "interdisciplinary databases."

Other languages like BRS/SEARCH and MESSENGER, among others, are rarely found and are distributed among particular disciplines.

In this situation, advice from specialists remains imperative. In the future, more extensive "user accessibility" must be made available.

What Are the Information Sources for German Databases?

Limiting the sources to the originating country can be a good policy for many information requests. In general, however, internationality is (or will have to be) desirable for reasons of comparison, completeness, or competition. A broad distribution from a geographical standpoint already exists[10]. Even Japan is taken into consideration for information logistics. This may be considered as evidence supporting a basically vital German database industry.

What Technical Contents Are Offered?

The possibilities of information through electronic media are diverse. The reason is the equally wide variety of information offerings or information carriers. The formal categories which can be distinguished are summarized in Table 4. It may be noted that bibliographic documentation still has a great lead in comparison with other contents. This type of documentation normally only allows indirect access to processes, results, computations, and technical literature. A countertrend in the production of databases has been observed since 1978; since that time, more databases with "direct information" (data documentation, process documentation, and object documentation) have been offered in comparison with bibliographic documentation (literature documentation[11]

In the future, the "detour" through the scientific paper or research report will surely be done away with for large areas of scientific-technical and business information.

How Current Can Information Be for What Interest Groups?

In the absence the possibility of direct observation, the currentness of databases can only be inferred indirectly from their so-called "updating." This technical term describes the regular insertion of new data into the system. Databases developed in the FRG normally feature good updating. This can be inferred from the fact that approximately 55 percent of the German databases insert new information on a daily to monthly basis.

For economic reasons this information must be made known to the largest possible group of interested parties and be available without major problems. Therefore, user restrictions are avoided to a large extent. The "target group orientation" to be reported is summarized in Table 5. It allows us to infer unrestricted accessibility for about 85 percent. A separate international comparison would be the only way to determine the "openness" of a specific, modern information policy in the FRG.

Table 1: Number of data banks produced in the FRG per discipline.

Rank		n	Cumulative	
1	Interdisciplinary and miscellaneous databases	28	15.2	15.2
2	Social sciences	21	27	11.8
3	Chemistry	17	36.6	9.6
4	Industry and trade	14	44.5	7.9
5a	Health, medicine, biology, sports	13	51.8	7.3
5b	Energy, physics, mathematics	13	59.1	7.3
6a	Metallurgy, materials metal processing and manufacture	10	64.7	5.6
6b	Environmental planning, civil engineering, urban planning	10	70.3	5.6
7	Technology	9	75.4	5.1
8	Nutrition, agriculture, forestry	8	79.9	4.5
9a	Humanities	7	83.8	3.9
9b	Environment	7	87.7	3.9
10a	Law	4	89.9	2.2
10b	Political science, interstate & intn'l relations	4	92.1	2.2
10c	Education	4	94.3	2.2
11	Transportation	3	96	1.7
12a	Geosciences & raw materials recovery, oceanology	2	97.1	1.1
12b	Consumer goods	2	98.2	1.1
12c	Patents	2	99.3	1.1
	Total	178		100

Table 2: Comprehensive disciplines: Coverage by databases produced in the FRG: number of databases by type of originating institution and by discipline.

Databases by disciplines		Percentage	Association	Percentage	Public institution	Percentage	Private trade and industry	Percentage
Natural science technology	73	41	2	1.1	39	22	32	18
Trade and industry (cf(1))	14	7.9	1	0.6	10	5.6	3	1.7
Health, medicine, psychology, biosciences	13	7.3	2	1.1	9	5	2	1.1
Social sciences and humanities, law and legislation	40	22.5	1	0.6	34	19.1	5	2.8
Other	38	21.3			29	16.3	9	5
Total	178	100	6	3.4	121	68	51	28.6

* Reported associations are categorized in this general listing by the type of producing institution in private industry, regardless of whether they are publically subsidized.

Table 3: Economic databases in the FRG (cf. (6)).

Rank	Contents	Number of databases
1	Product information	5
2	Macroeconomic data	3
3	Information on subsidiaries	2
4	Company data/Credit information	2
5	Business law	2
6	Business literature	1
7	Business news	1
8	Stock market news	1
9	Business connections	1
-	Marketing (not documented)	-
		18

Table 4: Types of documentation. Some databases use several types of documentation

Type of documentation	Number of databases	% (n=225)	% (n=178)
Bibliographic documentation with abstracts	58	25.8	32.6
Bibliographic documentation	52	23.1	29.2
Data documentation	39	17.3	21.9
Documentation on institutions	19	8.4	10.7
Project documentation	12	5.3	6.7
Full text documentation	6	2.7	3.4
Law documentation	6	2.7	3.4
Product documentation	6	2.7	3.4
Process documentation	5	2.2	2.8
Object documentation	4	1.8	2.3
Expert documentation	4	1.8	2.3
Media documentation	4	1.8	2.3
Other(*)	10	4.4	5.6
Total	225	100	126.6

* Data evaluation, data computation, patent documentation, deadline documentation.

Table 5: Target group orientation

"Target groups"	Number of databases	(n=178) Percentage
General public	148	83.1
General public with specialized interests	2	1.1
Public authorities	3	1.7
Scientific institutions/ scientists; students and projects, and project groups working in the relevant area	5	2.8
Only companies, members of associations or projects, and those participating in producing the database	18	10.1
Only users from the FRG	2	1.1
Total	178	99.9

FOOTNOTES

1. "Verzeichnis deutscher Datenbanken, Datenbankenbetrieber und Informationsvermittlungsstellen Bundesrepublik Deutschland und Berlin (West)": [Director of German Databases, Database Managers, Information Exchange Agencies in the FRG and West Berlin], Munich: Saur 1985.

2. This short report is based on the study by H.R. Simon, Chr. Frodl, S. Solberg: "Databases in the FRG--An Update--1985 Status, Part 1. Seminar report From the GID Lecture Series, Frankfurt, June 1986.

3. Leibinger H., "Are the Americans Better Informed?" INFOBASE 1986, p 6, reprint.

4. Cuadra, C.A., "Future Prospects: Revolution in Technological Databases, "INFOBASE 1986, p 9, reprint.

5. Leibinger H., "Are the Americans Better Informed?" INFOBASE 1986, p 6, reprint.

6. "Technical Information Program of the BMFT From 1985 through 1988," Table 5, p 77.

7. Schuhmacher, D., Venker, K.: "Utilization of Databases for Import, Export and Business Relations", pp 251-262, in "Proceedings of the 6th Spring Meeting of DGD [German Database Society] On-Line Users Groups," DGD Report (OLBG-5), Frankfurt, 2/84.

8. "Technical Information Program of the BMFT From 1985 through 1988," Table 5, p 77.

9. "Databases, databanks, networks" Rainer Kuhlen, ed. Munich: Saur 1979.

10. "Verzeichnis deutscher Datenbanken, Datenbankenbetrieber und Informationsvermittlungsstellen Bundesrepublik Deutschland und Berlin (West)": [Director of German Databases, Database Managers, Information Exchange Agencies in the FRG and West Berlin], Munich: Saur 1985.

11. "Technical Information Program of the BMFT From 1985 through 1988," Table 5, p 77.

8617/9869
CSO: 3698/M101

BRIEFS

FIRST CRAY 2 IN FRANCE--Following those in the UK and the FRG, the third European Cray 2 has just been installed in the Vector Computer Center for Research (C2VR) at the Ecole Polytechnique in Palaiseau. The Cray 2 is considered the most powerful computer in the world. In an extremely reduced volume it contains a main memory of 256 million 64-bit words plus four processors (basic machine time of 4.1 ns)--each more powerful than the Cray 1--capable of working on the same problem together, or independently of one another. The circuitry is immersed in a liquid coolant (carbon fluoride) that dissipates the 195-kw used. The exceptional size of the main memory associated with a 1.2-gigaflop calculated power makes it possible to envisage previously impossible applications of complex three-dimensional mathematical models. Its use at the C2VR a GIE [economic interest group] grouping 10 partners, including the CNRS [National Center for Scientific Research], CISI [International Company for Data Processing Services], IFREMER [French Research Institute for Exploitation of the Sea], INRIA [National Institute for Research on Data Processing and Automation], and the National Meteorological Service) will focus mainly on scientific research, meteorology, mathematics, aerospace, oceanography, and nonmilitary nuclear research. Its cost is approximately $18.9 billion. Also, Cray Research has announced the delivery to Peugeot SA of an approximately $6.6-million Cray X-MP/14 to be installed soon in the Citroen headquarters in Neuilly. It will serve the entire [Peugeot] group for applications in R&D, design, structural analysis, aerodynamic and acoustic studies, and collision simulation. [By Rene-Pierre Balme] [Text] [Paris ZERO UN INFORMATIQUE in French 22 Dec 86 p 5] 25046/9835

CSO: 3698/A092

EUROPEAN CONSORTIUM DEVELOPS MULTI-APPLICATION CIM SYSTEM

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 2 Dec 86 p 5

[Article: "New Data Systems for Factory Automation: Consortium of European Firms and Universities Develops CIM Application"]

[Text] Essen (SCHA)--Three companies and two universities in Europe are currently working on an intelligent CIM (computer integrated manufacturing) system. Under the central administration of the British firm Dextralog Ltd. of Blackburn, ICL in Stoke-on-Trent in Great Britain, Krupp Atlas Datensysteme GmbH of Bremen and Essen, and the technical universities of Delft and Twente in The Netherlands have formed an association. The four-year project will be supported in part by "Esprit," the European Strategic Program for Research and Development in Information Technology, and has as its objective the integration of planning, disposition, databank administration, signal monitoring and acquisition of operating data. Conventional systems today are not yet in a position to do this. The emphasis is on computer control and a hierarchy-based system for making control decisions. Work is also being done on on-line, real-time disposition using simulation techniques and on integrated real-time monitoring of cell controls.

The cell control section, which operates as an open system, is designed such that it can be integrated into a superordinate CIM system. Evaluations are performed using a model on which the performance capability of the control system and additional needed improvements can be shown. An industrial demonstration setup for modern CIM control systems with real-time behavior is planned for use in flexible automation. This project forms the basis for a system which is suitable for small- and medium-sized production runs within a flexible manufacturing system and which is thus usable by 70 percent of Europe's industrial production. Modern concepts of control which surpass the current state of the art are being realized with this system.

Within the consortium, Dextralog, one of the leading private European suppliers of monitoring and diagnostic systems, will assume the task of system coordinator using real-time behavior for production control. ICL, one of the largest computer manufacturers in Europe, will research the areas of cell

control and interconnections. Krupp Atlas Datensysteme will work in particular on the information system for decision-making and real-time disposition using simulation techniques.

In cooperation with the expert systems and information technology group at the technical university in Delft, Krupp Atlas Datensysteme will demonstrate the integration of an expert system which will provide support for the planning process. The infrastructure, as well as the communications between the production process and the computer work stations within the production areas, will be established in conjunction with the research office for production engineering at the technical university in Twente.

12552
CSO: 3698/214

ITALY'S ASEA DEVELOPS NEW METALLURGICAL TECHNOLOGY

Milan INGEGNERIA in Italian May-Jun 86 p 158

[Unsigned article: "A New Concept for Induction Heating of Liquid Metals"]

[Text] ASEA Metallurgy, a company belonging to the Gruppo Internazionale Elettromeccanico ASEA [International Electromechanical Consortium ASEA]has developed a new technique for induction heating of liquid metals. The system based on this technique is being marketed under the name ASEA Calidus.

ASEA Calidus opens new perspectives in the field of induction heating, both in the metallurgy and the application aspects. The external surfaces of metallurgical equipment such as furnaces, casting ladles, and containers, are made of a new composite materials with special properties which allow the heating by induction of the metal held.

Stated simply, the ASEA Calidus system is made of two parts: an induction coil for heating, and a movable ladle. The induction coil can be placed in a heating or maintainance mode. This characteristic offers many possibilities for metallurgical processes. Induction heating can now compensate the temperature loss of the fused metal incurred during the process and the ladle transfer. Processing time and temperature of fused metal can, therefore, be kept under strict control.

ASEA has identified numerous applications for the Calidus concept, among which are: fusion/maintainance of temperature; refining; casting in lots; continuous casting.

Calidus offers many advantages over the usual procedures for casting and conventional tapping. The procedure allows to tap

liquid material from the melt furnace at low temperatures and heat it to the desired temperature before casting. It's also possible to maintain good temperature control even during the casting.

This last capability is of utmost importance for high product quality. Additionally, the Calidus heating system allows the execution of various metallurgical treatments while the liquid metal is in the ladle, such as vacuum degassing while the metal is stirred and heated.

These are the principal advantages of the Calidus concept: higher productivity thanks to a shorter processing time; more flexibility of metallurgical treatments; accurate control and analysis of temperature; high degree of repeatability; better product quality; less energy consumption resulting in a reduction of production costs.

Practical experience

At the ASEA Powdermet plant in Surahammar, Sweden, a 2.5 ton capacity casting ladle has been operatin for two years and has functioned very satisfactorily. This installation consists of a ladle with a bottom tap located in an induction coil in the upper part of the atomizing chamber.

Thanks to the power of this unit-- 900 Kw at 200 Hz frequency-- the liquid metal heat up at a rate of 7C/minute. A cover is placed on the ladle before the atomizing process; the cover is connected to an intake system with a vacuum pump, thus controlling the pressure inside the ladle. The metal flow is therefore maintained constant during the entire atomizing process.

CSO: 3698/266

ANALYSIS OF BULL'S TAKEOVER OF HONEYWELL INFORMATION SYSTEMS

Bull's American Gamble

Paris L'USINE NOUVELLE in French 11 Dec 86 pp 4-6

[Article by Jean-Pierre Jolivet: "Bull: The American Venture"; first paragraph is L'USINE NOUVELLE introduction]

[Text] Double or nothing? Jacques Stern and Francis Lorentz made their choice. Bull will double its size and raise itself to seventh place among computer manufacturers worldwide. It is a double surprise, as Bull buys HIS and draws NEC into the venture.

The French computer business is off and running.... Having purchased Honeywell's computer activities, Bull has acquired a new stature, moving to seventh place in the ranks of computer manufacturers worldwide. Most importantly, it is breaking into the American market and strengthening its ties with the Japanese NEC company. What a turnaround in the French computer industry, which was on its deathbed 10 years ago!

With astonishing speed, Jacques Stern, chief executive officer, and Francis Lorentz, general manager--the duo which put Bull on a new path--have sewn up the Honeywell deal. Four months of intense negotiation, marked by many round-trip visits to the United States and Japan, was all it took to put together the delicate financial package.

Between now and April 1987, the HIS (Honeywell Information Systems) division will become a subsidiary. The new company--with an estimated 1987 sales volume of $1.9 billion--will be owned as follows: 42.5 percent by Bull, 15 percent by the Japanese NEC, and, for the moment, 42.5 percent by Honeywell. Bull will inject $130 million in cash, and NEC, which is seeking to strengthen its position on the American market, $50 million; the remainder ($350 million) will be raised in the financial marketplace by the new company.

The deal was capably negotiated by the company's French management, which knew how to convince its shareholder, the French Government. Their logic was accepted. The first stage of the operation will be completed in a few weeks; the second stage, in 2 years. Pulling out gradually, Honeywell will leave 65.1 percent of the capital to Bull, which will then become the sole master of the new company.

It is a spectacular revenge on history! "But not on Honeywell," insists Francis Lorentz. In 1976 the American company came to the rescue of the faltering CII [Compagnie Internationale de l'Informatique], acquiring 47 percent of its capital. Since 1982 the combined efforts of the Jacques Stern-Francis Lorentz duo and the government (Fr 3.7 billion in capital injected over 4 years) have put the top French computer company back on its feet. So much that Bull was beginning to marshal its plans for future international expansion. It had not expected it to happen so quickly....

Honeywell's announcement in early summer that it would withdraw from the computer business surprised Bull's management, just about to close its second profitable fiscal year: A strategic shift of this magnitude cannot be improvised. Brought back to their respective responsibilities last July, and affected by the overall spirit of industrial liberalism blowing from the Rue de Grenelle [Ministry of Industry], Jacques Stern and Francis Lorentz eagerly seized the opportunity. "Even though the deal is a little early for Bull," admits Jacques Stern, "we had to avoid letting HIS fall into anyone else's hands."

So plans had to be accelereated and contacts with Honeywell rapidly firmed up. And Bull was in the best position. "Is it not better to talk with partners you know well?" asks Bull's chairman. The message was understood by the Ministry of Industry, as well as that of Economy and Finances, which had asked Bernard Esambert--the man who negotiated the 1982 Bull-Honeywell cooperation agreement--to examine the consequences of a purchase of HIS by Bull.

Ties between Bull and Honeywell are close. Although much of its hardware is manufactured in France, 40 percent of the computers sold by Bull are of Honeywell origin. That is the situation with the DPS-6 and DPS-8, built at Angers. In 1985, Bull purchased Fr 650 million worth of hardware from HIS, but only sold it Fr 380 million. To this deficit we can add $20 to $30 million in annual royalties for HIS licenses.

In the area of architectures and operating systems, cooperation is even more obvious. For its management computers in the DPS line--except the DPS-7, which is of French design--Bull uses the G-COS software of Honeywell origin as does the Japanese NEC company for its Acos series.

A HIS takeover by another manufacturer would have seriously threatened Bull. Driven by these circumstances, Bull management therefore decided to purchase HIS. This decision guarantees Bull a future. Jacques Stern and Francis Lorentz have plans for the company. Now is the time, while the world computer business is restructuring, to maneuver for position. Those who sit and watch will be vulnerable. Burroughs sought Sperry to create Unisys, ranked second largest in the world; Control Data is seeking an opening, and AT&T is looking for computer expertise; finally, Siemens and BASF are joining forces for large compatible computers. It is a time of mergers. But bids are likely to rise very fast.

With control of HIS, Bull doubles its size. In 1987, the two companies will border on a $5-billion turnover. Edson Spencer, Honeywell's president, goes

even further: "The cumulative customer base of the three groups , Bull, HIS, and NEC currently makes up the second largest homogeneous installed computer base in the world. This represents 7 to 8 percent of the world market."

As pilot of the new company, Bull is reinforcing its international position in hopes of substantially increasing its exports (presently 36 percent of total sales), especially at a time when the French market is opening up to foreign competition. Bull will first target the United States, where HIS does about 60 percent of its business, and then Europe, where the American company's sales reached $700 million this year. "We are doing an excellent business in Europe," says Francis Lorentz, "because our different geographical locations, like our products, are complementary." So it is that HIS' Italian subsidiary, with its new DPS-4000 minicomputer, is well established in small- and medium-sized companies, while Bull has a stronger foothold in the bank and government markets. With the British subsidiary of HIS, Bull will be entering a market which, up to now, it has scarcely penetrated.

HIS' technological know-how also interests Bull. The American firm has mastered G-COS operating systems and DSA network architecture, and above all has an excellent understanding of IBM's SNA [System Network Architecture] environment. "An important feature for us," explains Jacques Stern, "because our future strategy rests on a network approach to the computer markets."

In addition, the move will make it possible to double the research effort of the two companies, taking it to $460 million. Finally, by expanding the shareholding base to NEC, Bull's management guarantees a stable relationship with their primary technological source for components and top-of-the-line computers (DPS-90).

A future member of the "Bunch," the companies which, combined, approach IBM's size, Bull will face the same difficulties as other large computer manufacturers in the United States: the slow growth (10 percent) of non-IBM compatible mainframes. Bull management is aware of this and does not deny the magnitude of its job. It will have to define a new strategy quickly. There is no margin for error--neither for Bull, nor for the company which will arise from HIS.

To this fundamental issue must be added those which are relevant to HIS itself. They will not be the easiest to resolve. "By keeping two separate companies," emphasizes Jean-Claude Buono, Bull's financial director, "we have stayed away from a merger and its problems." A wise decision. But as majority shareholder on the new company's Board of Directors, Bull will nevertheless have to continue the cleanup Honeywell has been conducting for the last 2 years. It will be a delicate operation: HIS has 22,000 employees worldwide.

While HIS remains profitable ($200 million in 1985), Honeywell's computers have been losing market share since the early 1980's, under pressure from IBM, DEC, and other minicomputer manufacturers. Its 7-percent growth was clearly lower than the industry's 10 percent in 1985, and its profits suffered as a result. Estimated at $1 billion in early summer--the Minneapolis company was projecting 1.5 billion--profits finally fell to $650 million when the figures were in. The solution may be to update an aging product line....

At the same time, the new company's management--which will remain American--will have to come up with an acceptable profit level. They will have to take steps to rationalize their production both in the United States and in Europe.

And, above all, success of the operation depends on Bull's long-term investment capability. The admission price to the United States is not very high, but the bill is likely to be much higher to follow through with the successful breakthrough than Bull seeks in a market where competition is fierce.

Technology Plans

Paris L'USINE NOUVELLE in French 11 Dec 86 pp 6-8

[Article by Patrick Franklin: "Technology: The NEC Plus Ultra for Bull"]

[Text] Will the French group manage to capitalize on its opportunity to use HIS' assets to finally coordinate its own line?

It is quite normal to look elsewhere for abilities you yourself lack. This is standard procedure in the computer business, where Digital and Xerox are signing development agreements; IBM and Matsushita, production agreements; and where computer and telephone manufacturers go forth hand in hand.

But beware of inconsistencies within the product line! Bull is adamant about retaining a cohesive catalog of products, with four names creating an impression of unity: Micral, Questar, SPS, and DPS. Is this a harmonious and compatible family in which each product is perfectly integrated with the others? Not really. Because to go from the DPS-7 to the DPS-8 or the DPS-90 means changing operating systems (from GCOS-7 to GCOS-8). The quality of the GCOS is not in doubt: It is recognized as an excellent basic software system. More and more companies, however, are reluctant to throw away earlier investments to take advantage of greater power: Favoring total compatibility within a line, they are hesitant to invest in one which is "disorderly."

Bull is not alone in this situation: IBM itself is inconsistent, to the point that it is difficult and financially ruinous to go from the 36/700 to the re-XX. Is this one of the reasons for the irrepressible rise of Digital, which seduces its customers with its famous compatibility?

According to Jacques Stern, one of the advantages of the new alliance will be the capability of "more rapidly integrating the products designed and developed by Honeywell into Bull products," with a more integrated R&D program.

But Bull is not established enough to juggle with inconsistencies. The harmony and durability of its line are at stake in this operation. The technological agreements with Honeywell and NEC (general business data processing), Ridge (scientific and technical data processing), and Convergent (Questar office automation workstations), along with the fact of designing equipment here and building it elsewhere, all lead for the moment to a catalog which seems discordant.

Bull brings together a series of hybrid products, ranging from American-Japanese, Japanese-French, and French-American, to Italian (Honeywell Italia): a hodge-podge which the Bull label cannot conceal.

Luckily, the picture is not completely black. In mainframes (large computers), the power range running the basic GCOS-8 software goes from 1 to 50, and Bull's most powerful model, the DPS-90/94, matches IBM's 3090/200.

Nevertheless, it is the DPS-7 which gives Bull its greatest satisfaction. This 18-model line represents 20 percent of the group's total sales, with 3,600 units sold, including one-third in the United States, through Honeywell, and another third in Europe (excluding France).

Satisfaction? That is not all: also pride. Except for the NEC processors used in the "7" line's two most powerful machines, it is a product completely designed and manufactured by the French company (at the Angers factory). The DPS-7 also has an excellent reputation with users, leading them to forget their complaints about the Mini 6, and it can be compared without modesty to IBM's 43-XX, Digital's VAX-11/780, and HP's 3000. In the opinion of Francis Lorentz, the DPS-7 represents Bull's revival (see interview below).

Nonetheless, continuing to scientific and technical data processing and all the way to office automation, there is a long list where you find Questar workstations from Convergent Technologies, Micral 30 and 60 microcomputers, SPS minis (including the SPS-9, which is actually a Ridge Computer unit with Risc architecture). Returning to operating systems, from mainframes to office workstations, the list includes 11 basic software systems: ranging from MS-DOS to GCOS-8, by way of Prologue, BOS-16, and UNIX SV.

The challenge Bull faces is to reorganize this disparate range quickly or run the risk of giving competitors an additional argument to use in attacking the French company's customers. Until now, Bull has been buying most of its offerings outside France or assembling them under license. This creates serious problems. Because buying machines here and there, fillings in the gaps with in-house products, and creating imperfect interfaces between them is an uncomfortable situation to be in when faced with rivals who are better equipped.

Honeywell has computers which are relatively complementary to those Bull is already selling. But so far as we know, there are no novelties in Honeywell's laboratories which could bring life to Bull's ponderous progress. The American manufacturer, which had let itself get lazy, losing ground to IBM and other members of the very exclusive leaders' club, has four main product lines.

The medium-term objective will be to bring together existing American and French product lines (at least as of 1990), though without abandoning NEC's computers.

Can the web be untangled? Yes, says a Bull engineer who wants to believe in the future, provided that the French company grows enough to impose its point of view. Bull has now earned its seat in the private club, along with Burroughs-Sperry-Univac (the new Unisys group), NCR, and Control Data, all IBM challengers. In this circle, nicknamed the "Bunch," the French will have to pack enough punch....

[Table] 1986 Bull Products: Large and Small Systems

System Types	General Data Processing	Operating System	Design	Manufacture
Large	DPS-7	GCOS-7	Bull (France)	Bull (France)
	DPS-8	GCOS-8	Honeywell (US)	Bull (France)
	DPS-88	GCOS-8	Honeywell (US)	Honeywell (US)
	DPS-90	GCOS-8	NEC (Japan)	NEC (Japan)
Small	DPS-4	GCOS-4	Honeywell (US)	Honeywell (US)
	DPS-6	GCOS-6/400	Honeywell (US)	Bull (France)

[Caption] Aside from the DPS-7, all the systems were designed in either the United States or Japan. Except for scientific and technical data processing, where Bull does better in research and production, and for microcomputers: the Micrals are clearly French.

Research Gains

Paris L'USINE NOUVELLE in French 11 Dec 86 p 8

[Article by Claude Amalric: "Research: The Godfathers Guarantee the Future"]

[Text] As a baptismal present, the joint subsidiary of Honeywell, Bull, and NEC will receive its godparents' technological expertise.

The gift will be provided by NEC, whose semiconductor division already supplies specific integrated circuits to the other two partners. In addition, memory units, which are used in large numbers in computers, have made NEC's fortune, accounting for 80 percent of its sales. Thanks to them, this company has become the number one semiconductor manufacturer worldwide. Mastery of memory technology is the key to very large-scale integration. NEC is also supported by the consumer market, whose memory purchases grow as the public "goes electronic" (compact-disk players, and soon digital TV). NEC thus has a substantial reserve of outlets for its memories.

But the Japanese company must increasingly integrate the different facets of this sector, or see its profits drop. It is gaining unique experience which is completely applicable to tomorrow's data processing needs, experience from which the subsidiary could benefit...to the extent that NEC allows.

Although NEC is also working on gallium arsenide (GaAs) circuits, it is apparently far behind Honeywell in this field. Thus, Bull's associates complement each other perfectly, since GaAs, a material three to six times faster than silicon, requires its own specific technologies, and here Honeywell is the leader.

Along with Philips, the Minneapolis company is a GaAs pioneer, having studied it for some 12 years, primarily due to military contracts. With its experience, Honeywell became the Pentagon's leading voice regarding this material. It is

maintaining this advantage as fierce competition develops, attracted by the billion dollars allocated to the field by the Defense Department. For example, half of the total $1 billion invested in GaAs research will come from customers in uniform.

Despite the cost of the material--a 3-inch slice of GaAs costs approximately $225, compared to $5 for the same slice in silicon--and a market which is slow to take off, Honeywell is not relaxing its efforts in this promising niche.

At Richardson (site of the division's factory and corresponding laboratories) work on circuits integrating logical and analog devices and optical switch controlled lasers continues to maintain its lead over the others--although no one actually knows what the Japanese are doing...or IBM, which has also turned to GaAs after abandoning the Josephson effect for superfast circuits. More than just a simple detour, this turn is proof of GaAs' future in data processing.

It will be used particularly in the optical computer, which all the big names in the field are studying feverishly. Here, light generates and moves information at its own speed: The optical computer is the inevitable key to the dizzying speeds needed for "Star Wars," and later on by business. And here again, Honeywell is among the front-runners....

Of course, the subsidiary will not have it all. But while Honeywell is saving its best for the military, it has withdrawn from computers, a field where NEC thrives. Somewhere between these two extremes is the contribution it can bring to Bull.

Francis Lorentz Interview

Paris L'USINE NOUVELLE in French 11 Dec 86 p 9

[Interview with Bull General Manager Francis Lorentz by Alain Pauche and Jean-Pierre Jolivet: "NEC Does Not Scare Us"; date and place not given]

[Text] L'USINE NOUVELLE: Bull, former Honeywell subsidiary, moves into key position. Is this revenge, or a challenge?

Francis Lorentz: Surely not revenge against Honeywell, our favored partner for 15 years. We are not trying to conquer America: We are adapting to the requirements of a market which ignores borders. Our customers want to be able to communicate with all their subsidiaries around the world, with the same hardware and the same software. So it is necessary to be at the level of the world market.

But one must also have increasingly competitive products. That implies the need for collaboration to achieve essential economies of scale and more efficient R&D: The combined R&D investment of HIS and Bull was $460 million in 1986. That gives you a good idea of the size of the stakes.

We are reinforcing our alliances and taking control of HIS. However, HIS is not being annexed. Data processing is international, but its roots are national. We have to become rooted in our markets. HIS will remain fully American, and its management will be American.

I would like to emphasize that, thanks to this agreement, we are making our coverage of Europe complete, because we were not in Great Britain or Italy, which represent one-third of total HIS sales. But we also gain direct access to the American market, the most competitive and the most difficult. Our short-term ambitions are limited. But to survive, it is necessary to compete in the toughest market, which is also the largest.

[Question] Has NEC accepted Bull as the boss?

[Answer] In any association, you need a boss. Supply cooperatives are useful when building common components, as in the automobile industry. When it is necessary to direct a strategy, a pilot is needed. The majority stockholder is Bull. NEC has accepted that. It will be a true partner, not just a financial investor; but it did not ask to be major holder!

As for the general structure, we very quickly came to an agreement based on the logic of the market. In a world market dominated by IBM, none of us could independently achieve success. As Honeywell, Bull, and NEC products are compatible among themselves, but not with IBM, we can create an integrated line.

[Question] Do you fear NEC?

[Answer] NEC has been our partner for 3 years: One does not choose one's allies from the enemy camp. We have nothing to be afraid of: We are as competent as they. Disciplined and persistent daily efforts do not appeal to Frenchmen, but are the lifeblood of the Japanese. They will be our lifeblood tomorrow. Bull's ability to get back on its feet--the success of the DPS-7, for example--has impressed NEC. The Japanese are excellent partners if they respect you. If you are competent and you get good results, they have neither reason nor desire to cross swords with you.

[Question] What is your new European strategy?

[Answer] Nothing has changed. European manufacturers are united against the American manufacturers who dominate the world market. Together European manufacturers represent less than 10 percent of sales, but Europe makes 30 percent of purchases. One basis for our solidarity is the standardization of communications: To create a Europe where a single set of standards is conformed to. Another is research. The ESPRIT program of the AI research center which we created in Munich with ICL and Siemens point the way. Bull will continue to work in this direction.

But let us be clear: There is no more a specifically European data processing identity than there is a French one. Technologies and markets do not recognize borders. The future belongs to those who can weave a network of alliances on a global scale.

[Question] How will you finance this acquisition?

[Answer] The transaction will cost us about Fr 900 million in 1987, and about half that in 1989. The 1987 payment includes partial repurchase of Honeywell holdings in Bull SA and in our international subsidiary. Before the purchase, our total 1987-1990 investments were valued at Fr 15 billion (including more than Fr 3 billion in 1987). That included acquisitions aimed at reinforcing our bases abroad, the first priority of our 1987-1990 plan.

The financing of this program must be healthy, that is, it must lead to an improvement of our financial statement. Our objective is to come back to a 1990 liability/assets ratio of approximately 1 (it is 1.6 today). We need Fr 1 billion in outside equity in 1987. This capital can come either from the present shareholders (the state holds 90 percent) or from the financial market. The HIS takeover does not alter this picture. HIS will be slightly profitable in 1986. Our new subsidiary should be able to support itself.

[Question] What is your preference?

[Answer] Anything which allows us to expand our position in the financial market is positive. That will reinforce our commercial credibility and allow us to erase whatever is left of the image of a protected company. Bull knows how to find funding on the financial market. There are many possibilities; it is a question of combining funding from the shareholding state and from the financial market. But we have to move carefully, because we are still getting back on our feet.

[Question] Thanks to this agreement, will the government be able to "privatize" Bull?

[Answer] That is its responsibility. I would note that 43 percent of Bull's capital could potentially be held by private shareholders: 10 percent directly, and 33 percent in bonds convertible against shares on which the state guarantees transfer.

[Question] Will the consolidation trend continue in the data processing industry?

[Answer] Yes. At the start of 1986 there were a dozen manufacturers of large and medium systems. By the early 1990's there may be only seven or eight. Bull will be one of them. Supported by a solid network of alliances, Bull is not far from critical size. As long as we strengthen our specialization not so much in terms of products as of market: What will matter more and more is not to be average everywhere, but to be very good in providing answers (what we call "solutions") to the needs of a certain type of customer, activity, or data processing application. That is the path Bull has chosen. HIS' contribution and the partnership with NEC and Honeywell are additional assets assuring our success.

Financing Steps

Paris L'USINE NOUVELLE in French 11 Dec 86 p 6

[Text] [Box p 6]

Where Will the Money Come From

$650 million.... That is the value of the assets which Bull, NEC, and Honeywell will share in the new company created to buy a large portion of HIS' activities. This amount does not include acquisition of the most profitable part of the American company: government sales, an internal Honeywell subsidiary.

The financing of the purchase will be via the creation of a new company with $300 million in capital. The company will then go the American financial market to seek the additional $350 million needed.

It is a shrewd set-up, as it will initially allow Bull to acquire 42.5 percent of HIS while laying out only $130 million in cash (or Fr 900 million).

How will the French manufacturer, which is frequently reminding us of its 1986 comeback, pay for HIS? The group's management is very reassuring on that point: The purchase fits perfectly in next year's Fr 3.2-billion investment plan.

The amount is nevertheless enormous, compared to this year's expected net profits, about Fr 220 million. Granted, self-financing will pay a large share of the expenses (about Fr 2 billion next year). Nevertheless, to find the remainder, they will have to increase their equity, because Bull is still heavily in debt: 1986 liabilities came to 1.6 times invested capital. It is a ratio which has clearly been improving, but it remains insufficient, because financial costs this year will equal 3.5 percent of sales.

Recourse to shareholders is thus inevitable. It will allow them to find Fr 1 billion in equity capital and to retain a healthy financial structure in the short term. The state could agree to come up with Fr 500 million. But Bull will have to find the rest in the financial market....

So, the French group has little room to maneuver. HIS will absolutely have to make a positive contribution to Bull's still weak results, or Bull will have to continue to live on credit...from the state.

25051/12859
CSO: 3698/A080

PROSPECTS FOR SEMICONDUCTORS IN EUROPE

Milan INGEGNERIA in Italian May-Jun 86 p 157

[Unsigned article: "Greater Productivity Research Accelerates Automation in Semiconductor Production"]

[Text] As the lines traced on integrated circuit boards become finer, the need for dust-free production environment increases. According to a new study by Frost & Sullivan, the prospects for greater productivity rather than savings in labor costs are what will encourage the European semiconductor industry to invest substantially in automation software and hardware in the next 10 years.

These investments, calculated in constant prices, will increase at an annual rate of 40.3 percent between 1986 and 1990. Afterwards, sales will stabilize, and the rate of increase for the period 1986-1993 analyzed by the study "The European market for automated production of semiconductor wafers" (E864), will be 27.7 percent.

In absolute figures, the market is of modest size, with a forecasted increase from $ 12.1 millions in 1986, to $ 66.9 millions in 1993-- equal to one tenth the US market.

Nevertheless, according to Frost & Sullivan, this movement in Europe toward automation of semiconductor manufacturing is much more important than what the figures show. This is because in Europe research is conducted in cooperation with government bureaus. Therefore, European experiments in automation will become public domain much faster than in the USA, where anti-trust laws limit such research within individual companies.

Europe has thus become a sort of test market under close scrutiny by the whole world.

The study analyzes two specific projects that stand out for their role as trend setters: the Siemens-Philips 'Megachip' project, and the AMT project by the English company Alvey.

In the sector of global factory management systems, the study indicates that the number of producing companies has dropped from a half a dozen to two: Consilium Inc., and the PROMIS group of the I.P. Sharp Associates. This has resulted in an unexpected hardware monopoly on the part of Digital Equipment Corporation.

Local host and control systems remain a more open sector of the market, and one of the major suppliers is the Dutch company ASM.

Automated transport equipment is now beginning to be used in Europe, and the principal manufacturer of 'clean' automated guided vehicles (AGV) is VEECO.

According to Frost & Sullivan, from now till 1993 investments in hardware and software for factory management-- which are now substantial-- will decrease; on the other hand, investments in real time monitors and transport equipment, will increase.

The United Kingdom is considered a market slightly more developed than Germany, although Germany has greater production of integrated circuits. France follows at a distance. A country to watch, in the market of automated production of semiconductors, is Spain; Spain has competent engineers and a cheap labor force.

The cost of the study is $ 2450.

13120
CSO: 3698/266

BMFP EXTENDS PERIOD FOR MICROSENSOR RESEARCH SUBSIDIES

Duesseldorf VDI NACHRICHTEN in German No 42, 17 Oct 86 p 22

[Article by Joerg Lentz: "Microperipherals for Small and Medium Companies: BMFT Extends Application Period for Subsidy of Microsensor Research"; first paragraph is VDI-NACHRICHTEN introduction]

[Text] Berlin, 17 Oct 86 (VDI-N)--The application period for indirect-specific measures within the "microperipherals" subsidy priority program of the Federal Ministry of Research and Technology (BMFT) started in 1985 has now been extended. Companies can apply for subsidies for the development of microelectronic compatible sensors until 30 June 1987. In particular, the targets of the program are small and medium-sized sensor manufacturers who want to enter the field of modern miniaturization technologies as well as companies which already have these technologies and want to develop microsensors for the first time.

Experiences to date of the VDI/VDE Technology Center for Information Technology in Berlin, which is in charge of managing the subsidies of these indirect-specific measures, show on the one hand that the target group has been reached with the receipt of 400 applications, two-thirds of which are from small and medium-sized companies. On the other hand, it is also evident that it would be a good policy to extend the preliminary period, that is, the application period.

In order to participate in the "microperipherals" subsidy priority program, many companies must accelerate a process which competition would normally only impose at a later time. Conventional sensor manufacturers must introduce new technologies (process innovation) in order to manufacture microsensors in the future. Therefore, it is necessary to establish a long-term company strategy. A technology that is appropriate for the company and its future products m ust also be selected under consideration of technical and personnel aspects. Roughly 70 percent of the companies already subsidized belong to this group. Also a growing number of companies already well equippped for miniaturization technology have started the development of new products like microsensors (product innovation).

The extreme increase in applications within the indirect-specific measures for the "microperipherals" subsidy priority program has shown that product and process innovators need an extension of time in order to make decisions. In addition, there is the general problem of the lack of qualified developers in the area of miniaturization technologies, as evidenced in virtually all applications. Finally, the extension of the application term also considers the fact that the delayed consensus of the EC delayed the start of this major subsidy priority program.

The basic need for a forced development of micropheripheral components results from the discrepancy between highly efficient microelectronic components, on the one hand, and the lack of suitable sensors and actuators, on the other. In addition to cost, this discrepancy also concerns efficiency, problem-free physical and electrical compatibility with downstream data processing and last, but not least, availability. In order to remedy these deficiencies and thereby reinforce our international competitiveness in measurement technology, the "microperipherals" subsidy priority program was started by the federal minister for research and technology within the framework of information technology. DM400 million have been allocated for 1985 to 1989. The subsidy priority program pursues three objectives:

--A base of expertise for future sensor and actuator design must be created in joint projects, through which new products can be expected only indirectly. The measure addresses the precompetitive area. Scarce R&D resources must be pooled through the cooperation of several companies and/or research institutions. DM200 million are available for this measure.

--In order to facilitate the introduction of new technologies, especially for small and medium-sized companies, DM20 million are provided for technology transfer. Among other things, the BMFT is subsidizing four teaching laboratories located throughout the FRG where practical and theoretical courses on thin and thick film technology are offered. The courses address businessmen, developers, and laboratory specialists and have enjoyed active participation to date.

In order to quickly obtain a broad range of efficient sensors in the already known basic technologies, the development of microsensors will receive a DM180 million subsidy within the indirect-specific measure.

There are no time limits on applications for joint projects and technology transfer. The essential characteristics of the indirect-specific measure are as follows: All R&D work for product development within a clearly limited field of technology (specific aspect) is subsidized through a simple, wide-ranging procedure; and, the decision of an individual company is not influenced by the government (indirect aspect).

A microsensor in the sense of the guidelines for "microperipherals" is a miniaturized sensor compatible with microelectronics. It transforms a physical or chemical measurement into a proportional, noise-free electrical sensor signal and consists of a measuring window, the senor element, a device for preliminary signal processing, and a housing.

The microsensor forms a unit. The individual components, the sensor element and the signal processor, cannot function independently. If, for technical reasons (for example, high temperature in the operational area), the signal processor is detached from the microsensor, then the preliminary signal processor must perform an additional reduction of the measured data for decentralization of measurement processing.

The preliminary signal processor is designed in miniaturized technology within the microsensor and is suitable for surface-mounted devices (SMD), hybrid technology, or monolithic integration. In this way the requirement for miniaturization and compatibility with the microprocessor are to be met.

The BMFT microsensor subsidy includes the following payments:

The maximum subsidy for a company, regardless of the number of projects, is DM800,000 for an independently developed microsensor, whose sensor element is designed in thick film, thin film, hybrid, or surface-mounted technology. The subsidy is reduced to DM400,000 if the sensor is developed with sensor elements that are available on the market.

A preparatory phase can be subsidized with a maximum of DM50,000 for well-established sensor manufacturers who can document annual sales of at least DM1 million for independently developed microsensors. Among other things, the scope of the preparatory phase can be to elaborate a development plan for a microsensor or to select and become skilled in a miniaturization technology.

Applications for actual microsensor development can either be submitted exclusive of the subsidized preparatory phase, or subsequent to it. The prerequisite for the development phase is the existence of the necessary laboratory-scale technological equipment.

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BRIEFS

ES2 PLANT UNDER CONSTRUCTION--ES2's [European Silicon Structures] European plant is now under construction in France near Aix-en-Provence, and production of customized semiconductors is scheduled to begin this coming summer. In the meantime, ES2 will continue to rely on Excel's plant in San Jose, California. When completed, the [fully equipped] factory will cost approximately $60.6 million and will provide jobs for 300 employees. ES2's French subsidiary will produce ASIC circuits [Application Specific Integrated Circuits] and will use an electron beam machine for designing circuits on silicon wafers. ES2 is a European joint venture between the following partners: British Aerospace (Great Britain), Brown Boveri (Switzerland), Bull (France), Olivetti (Italy), Philips (Netherlands), Saab Scania Combitec (Sweden), Telefonica (Soain), and Telfin (Belgium). [Text] [Milan ELETTRONICA OGGI in Italian 15 Feb 87 p 28] 8704

FRENCH-ITALIAN GALLIUM ARSENIDE RESEARCH--Our National Program for Microelectronics and Philips laboratories in France are conducting research toward the development of semiconductors in which gallium arsenide substitutes silicon. One of the five subprograms of the National Program for Microelectronics-- for 'materials and devices for microwave and optoelectronics'-- employs the high velocities of Gallium Arsenide (GaAs) free charges and its properties of light emission to generate transmission and reception of signals in the microwave, infrared, and visible frequencies. In France, the Philips physics and electronic laboratories have confirmed the appearance on the market in the near-future of integrated circuits using GaAs. Indeed, the future memory of the Cray-3 supercomputer is being built under a contract signed last year with Cray Research. In 1984, the GaAs semiconductor market share was only 76 million dollars, but its growth-- estimated to be at a higher rate than all the other semiconductors-- implies a share of business reaching 7 billion dollars in 1990, of which one billion will be the European share. Also in Europe, the Plessey, Thomson, and Siemens laboratories are working on devices which make use of this technology; while, as part of the European research program, ESPRIT, applications to fast circuits are being developed. [Text] [Milan L'INFORMATICA in Italian Oct 86 p 10] 13120

CSO: 3698/267

EEC TO LAUNCH 'ADAPTIVE INTELLIGENCE' PROGRAM

Brussels EEC PRESS RELEASE IP(87) 68 in English and French 16 Feb 87 pp 1-2

[Article: "'Brain': Europe Anticipates the Japanese 'Human Frontier' Challenge"; first six paragraphs in English, rest in French]

[Text] To teach a computer to learn, to see, to recognize, to make connections, to pass a judgment, in a nutshell to make it a replica of the human brain functions: this is the very goal of an ambitious project which the European Commission wants to launch.

Vice-President, Karl Heinz Narjes, has invited leading personalities from various scientific horizons in the European Community to prepare this new challenge. Wednesday, February 11, they decided to set up, for May 1987, a programme related to so-called "adaptive intelligence", a step ahead of "artificial intelligence" thus anticipating the recent Japanese "human frontier" programme.

The Europeans have indeed taken the lead in certain areas exploring the human brain to the benefit of totally new generations of computers.

The Japanese government, in the now classical Japanese way of doing things, i.e. a consensus among government and industry based on a long term strategy, decided to spend some 200 billion yen over ten years to explore what is referred to as "the human machine".

US Guru Finds Brain Interesting

Leading European scientists, as usual, exchanged views internationally with colleagues outside Europe. In this case Professor John Hopfield (CALTECH-San Diego), the "world guru" in artificial intelligence, has said that the "BRAIN" project justifies a priority action at the European level.

The scientific personalities who met with the European Commission experts, on February 11, have appointed six of their colleagues to prepare a comprehensive programme for May 1987. This would then be submitted to the Members of CODEST (The Committee for the Development of European Science and Technology), a body of leading scientists set up to advise the European Commission.

BRAIN (Basic Research in Adaptive Intelligence and Neurocomputing) has a great deal of potential. Robotics in particular will be one of its future markets. Artificial intelligence, or as European experts describe it, "adaptive" intelligence, should lead to the design of industrial robots that could literally see what they are doing, instead of blindly performing pre-programmed function as they do today.

Specifically, "adaptive" intelligence aims at upgrading the computer's functions. Although the computer is indeed capable of computing at infinitely faster speeds than the human brain, its functions are still limited to sequences. The human brain, however, is much richer than the computer because it is capable of reacting simultaneously to several requests and especially because its learning process changes continuously.

The potential budget to launch the program could amount to some 20 million ECU for the 1987-1988 period. It is granted in the framework of the European research stimulation program (the Europe of Researchers), which was approved in 1984 and covers the 1985-1988 period. By way of comparison it might be useful to point out that Japan has allocated a 1987 budget of 197 million yen (1 ECU = 174 yen) for the feasibility study phase of the "human frontier" project.

The six personalities in charge of preparing the project are:

--Dr G. Toulouse (Physics Laboratory--Ecole Normale Superieure, Paris);

--M. Rolls (Department of Experimental Psychology, Oxford);

--Prof D.J. Wallace (Department of Physics--University of Edinburgh);

--Dr C. Von Der Malsburg (Department of Neurobiology--Max-Planck Institute, Goettingen);

--Prof W. Singer (Brain Research--Max-Planck Institute, Frankfurt);

--Prof G. Parisi (Physics Department--Rome 1 University).

25048/6091
CSO: 3698/A157

EC VICE PRESIDENT URGES COMMON ECONOMIC, RESEARCH EFFORTS

Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 443, 17 Nov 86 p 13

[Article under the "TN Commentary" rubric: "The Role of the European Community in the Process of Innovation: by Karl-Heinz Narjes, vice president of the EC Commission]

[Text] With the rapid progress of technologies centered around microelectronics, the collection and processing of information on economic processes is gaining importance. The information factor is becoming the third most important production factor after work and capital. On the horizon one can foresee the transition from the traditional industrial society to an "information society."

The Community can make important contributions to meet this challenge:

--I see its major task as the creation of conditions that will permit innovative processes to be implemented, strengthened, and accelerated all over Europe. A uniform innovative area and market must be created where research, development, teaching, and learning will be made possible unhindered by national borders.

--Specific Community actions must be included in this global frame. They must serve as catalysts for the creation of transnational structures in the fields of education and training as well.

The processes of innovation in Europe suffer from the fact that the Community's market is in part strongly fragmented 18 years after implementation of the Customs Union. The basic privileges of the Common Market--free circulation of goods, people, services, and capital--are still withheld from the citizens of the Community in important areas. Complicated customs formalities are still necessary because of differences in taxation; narrow-minded authorities and protectionist-minded manufacturers are still hindering Community-wide competition by adhering to standards and product regulations; suspicious economic policy behavior is still being practiced through the mutual cloistering of public supply markets precisely in the most important sectors of technology; unilateral national regulations still hinder the best allocation of the capital available in the Community. As a result of this

inadequacy of the market, the potential of the largest economic area in the industrialized world, with 320 million inhabitants, is utilized only in a sub-optimal manner. Innovation and growth possibilities lie fallow.

Without the rapid and complete realization of the Common Market, the economic and political self-affirmation of Europe will not be possible in the long run. This position was adopted by the European Council last year. It adopted the plan of action prepared by the Commission for the development of the internal market and set 1992 as a binding deadline. This goal was also formally registered in the Single European Acts.

The desired definition of a technological dimension is closely related to the creation of the internal market. A European technological community was instituted in principle by the European Council and has been formalized within the European Acts as well.

In an integrated, continent-wide area of research and innovation, research and development efforts could be better directed with respect to each other, and modest financial and human capital resources could be pooled into common actions on the pre-competitive level. The goal is the efficient utilization of the available creative wealth in Europe, but without renouncing the productive stimulation of the market and competition. The Community R&D framework program for the years 1987 to 1991, on which the Council must decide by the end of this year, includes the necessary measures and steps for this purpose.

It is now up to the governments and parliaments to demonstrate the seriousness of their solemn statements, thereby also retaining their credibility with their own citizens.

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CSO: 3698/M105

EUROPEAN INNOVATION NETWORK HIGH TECHNOLOGY BUSINESS CENTERS

Berlin BIG NEWS in English Nov 86 p 3

[Article from journal of the Berlin Center for Innovation and New Enterprises (BIG): "EBN Creates International Links Between BICs;" first paragraph is BIG NEWS introduction]

[Text] Over the past 5 years Western Europe has witnessed a proliferation in the number of Science Parks and Innovation Centers. With the establishment of the European Business and Innovation Center Network (EBN) in December 1984 an important step has been taken towards adding a transnational dimension to these initiatives. EBN's objectives are twofold: first, to help establish a new generation of Business and Innovation Centers (BICs) which specialize in the launching of high technology companies and, secondly, to integrate existing and new Centers into a network through which client companies can exploit the European market.

Founders of EBN included 12 Science Parks from 7 European Community member states and a number of multinational companies closely associated with national enterprise creation schemes.

The extent of private sector interest in EBN was demonstrated by the fact that the chairmen of some of Europe's top companies agreed at the outset to join EBN's board. The Association's president is Vicomte Etienne Davignon, a former vice-president of the European Commission and now chairman of Belgium's largest holding company.

Catalyst in Formation of BIC Consortiums

From the beginning EBN has also received the European Commission's backing. Within the framework of the EC regional policy, Business and Innovation Centers are acknowledged as a vehicle for promoting the type of new enterprises upon which the regeneration of the Community's depressed regions ultimately depends.

EBN's achievements are easiest to measure in terms of progress being made to realize its first objective, the creation of new BICs. In 1986, the first

full year of operations, no fewer than 21 projects have been initiated, half of which are now at the business planning stage of development. European Commission grants towards start-up costs are likely to total around 3 million ECU for the year as a whole, matched by an equal commitment from other sources.

The role played by EBN is that of a catalyst in the formation of BIC consortiums, and honest broker in subsequent negotiations between sponsors, who typically include local authorities, universities and the private sector, and the European Commission. Although it is far too early to pass judgment on these new BIC initiatives, it is reasonable to assume that most will succeed. EBN is well on the way to achieving its objective of a European network of 100 new generation BICs. Creating a network depends not only, however, on building up a "critical mass" of members, but also on consolidating links between them.

As a first step towards consolidating the EBN network, nine Business and Innovation Centers are now participating in the European Commission's 1984-86 "Plan to promote Transnational Cooperation between Technology and Innovation Management Advisory Services." Judging by the meetings held so far, cooperation between these BICs will result in a number of client companies from different European countries signing cross-licensing and joint venture agreements. With the support of EBN, a further six BICs have applied to join the European Commission's scheme during the course of this year.

EBN's Data Base and Electronic Network, which is being developed for the Association by a Belgian bank, and which is due to become operational by the end of 1986, will speed up the process of developing cross-border links between BICs.

Number of Members Doubled in 1985

EBN representation of Business and Innovation Centers at international trade fairs is also a means by which the cost of providing client companies with access to the European market can be reduced. During 1986 EBN has participated in three trade fairs, Barclays Techmart und Techex in the United Kingdom and the Hannover industrial fair in West Germany. The latter event provided the occasion for the much published launch of the EBN's "Innovationsbruecke" between the Aston Science Park near Birmingham in England and the Berlin Center for Innovation and New Enterprises.

Over the past year EBN's membership has nearly doubled. The Association now consists of 30 full members (Business and Innovation Centers) and just over 70 associate members (multinational companies, banks, firms of consultants, etc.). A large proportion (50 percent) of its members are still drawn from two European Community states, Italy and the United Kingdom, reflecting the initial thrust of EBN's new BIC program. The recruitment of additional members is, however, now proceeding most rapidly in Spain and Portugal.

As for the immediate future, EBN will be pressing ahead with its program of launching new Business and Innovation Centers throughout next year. The

Association's 1987 program now in preparation also includes another series of international conferences, scheduled to take place in London, Madrid, and Rome. A new-styled newsletter is planned as well as further publications on themes related to Business and Innovations Center operations. Finally, if all goes well, 1987 should mark a breakthrough in EBN's attempts to establish a European Seated Capital Fund for BIC client companies.

EBN's activities are coordinated by a Brussels-based office. The staff of 10 includes executives from various associate member companies. Head of the EBN office is Mr Jan Dekker, who relinquishes a senior appointment with the European Commission this November. Chairman of EBN's Executive Committees is Mr C. Norman Butler.

Further details about the Association, including membership application forms, can be obtained from: EBN, 89, rue Froissart, 1040 Brussels, Belgium. Tel: (02) 2 31-07 47.

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CSO: 3698/M118

MULTILATERAL TECHNOLOGY PROGRAMS IN EUROPE OUTLINED

Brussels ATHENA in French Nov 86 pp 29-34

[Unsigned article: "Innovation Within the Community" first two paragraphs are ATHENA introduction]

[Text] In the previous issue of ATHENA, dated October 1986, we presented a document by the Social and Economic Committee of the European Economic Community, entitled "Innovation Within the Community: Organizations and Programs."

Following this description of EEC programs, we now present a list of the multilateral and bilateral programs and organizations in Europe:

- European aerospace programs administered through the European Space Agency [ESA], including the Columbus, Ariane 5, and Hermes projects, as well as Arianeespace, Eutelsat, Eumetsat, and Apollo;

- Nuclear research and collaboration on a European (non-EEC) level, with the CERN [European Center for Nuclear Research] and the Superphenix-Nersa company;

- The European aeronautics industry, with Airbus Industrie and, lastly, innovation-oriented technological collaboration among European manufacturers administered through the EUREKA project.

The European Space Agency

Objectives

To ensure and develop cooperation between European countries in the field of space technology and research, exclusively for the peaceful scientific use of these technologies in space and for space application systems: by developing and implementing a long-term European space policy as well as other space programs and activities; by coordinating the European space program and national programs; by developing and implementing an industrial policy consistent with its program; and by recommending an integrated industrial policy to the member states.

The ESA and its installations employ a total of some 1,360 people. An estimated 20,000 work in the space industry throughout Europe, excluding university and government employees. ESA activities have benefited many sectors (telecommunications, meteorology, agriculture, environment, materials processing, information technology). The industrial market for space activities in the 1990's has been estimated at 300 billion Belgian francs.

Infrastructure

The administrative divisions of the ESA are the Council, composed of representatives from the member states, and the office of the General Director with its support staff. Eighty-five percent of the agency's resources go to industrial contracts (between 500 and 600 per year) to obtain the services and materials the agency needs for its programs. In addition to its headquarters in Paris, the agency's main installations are the ESTEC (European Space Research and Technology Center) in Noordwijk in the Netherlands, the ESOC (European Space Operations Center) in Darmstadt in the FRG, and the ESRIN (European Space Research Institute) in Frascati in Italy. In addition, ESA technical teams are assigned to national institutions to carry out specific programs.

Achievements and Outlook

Development of three European organizations (see below):

- Arianeespace (marketing of the Ariane launcher)
- Eumetsat (managing a meteorological satellite system)
- Eutelsat (managing a European satellite telecommunications systems)

The principal satellites in orbit as of 1985 are:

- Scientific Program
  - ISEE-2 (exploration of earth-sun relations)
  - IUE (ultraviolet astronomic observations)
  - Exosat (observation of X-ray sources)

- Applied Program
  - OTS-2 and ECS-1 & 2 (telecommunications)
  - Marecs 1 & 2 (maritime telecommunications)
  - Meteosat 1 & 2 (meteorological observation of the earth)

The principal projects now in progress are:

- Scientific Program
  - Space telescope (ESA contribution to the NASA program)
  - Ulysse (space exploration by probe)
  - Hipparcos (astrometrical measurement)
  - Giotto (space probe studying Halley's Comet)
  - ISO (infrared space observatory)

- Applied Program
  - ESC-4 & 5 (telecommunications)
  - Olympus (development of a space platform for satellite-to-receiver telecasting)
  - ERS-1 (ocean exploration and ice monitoring)
  - Meteosat-P2/Lasso & Ops. Prog. (meteorology)
  - Spacelab and Spacelab Fop (space laboratory)
  - Microgravite (microgravitational studies)
  - Eureca (retrievable instrument carrying space platform)
  - Columbus (space station development)
  - Ariane 4 and 5 (new launcher generations)

Meeting in Rome on 31 July 1985, the ESA Council also decided:

- to participate with the United States in the construction of a manned orbiting space station;
- to approve the Columbus project (laboratory integrated in a space station);
- to develop the Ariane 5 launcher generation;
- to undertake studies on the Hermes and Hotol (horizontal take-off and landing) programs. These projects involve a vehicle capable of taking off, landing, and performing space flights.

Columbus

The Columbus project is the continuation of the Spacelab and Eureca projects.

The project is for a space station capable of serving as a manned space laboratory, to be jointly developed and utilized by the ESA and NASA. The respective contribution of each of the parties and a timetable for development should be discussed and set in December 1985 [as published].

Columbus is not expected to begin operation before 1992.

Ariane 5

The design of this new launcher includes two solid propellant boosters in the first stage, with 500 metric tons of thrust each, and a low temperature technology main stage propelled by a single engine, the HM-60, with some 100 metric tons of thrust.

The Ariane 5 should be operational for unmanned flights around 1995, when it will be able to launch a 15-metric-ton payload into low orbit or 8.5 metric tons into geostationary transfer orbit.

Ultimately, around 1997, the Ariane 5 is to be used to launch a spacecraft such as Hermes on manned flights.

Hermes

The Hermes space shuttle is designed to carry from two to six astronauts and a maximum 4.5-metric-ton payload into low orbit up to 500 km, where the future space stations (such as Columbus) will be located. It should make its first flight around 1997, powered by the future Ariane 5 rocket.

Hermes will be developed in France by the CNES (National Center for Space Studies) in collaboration with the companies Aerospatiale and Avions Marcel Dassault-Breguet Aviation.

Eight European countries have expressed a desire to participate in the program (Austria, Belgium, Denmark, Ireland, Italy, the Netherlands, Sweden, and Switzerland). Participation by the FRG is currently being discussed.

The total cost of the program is now estimated at some 2 billion ECU, or more than 80 billion Belgian francs.

Arianeespace

Objectives

Development and production of the European Ariane launcher within the framework of the European Space Agency.

Description

A consortium of companies from 11 European countries. French shareholders: 59.25 percent; German: 19.60 percent; Belgian: 4.40 percent; Italian: 3.60 percent; Swiss: 2.70 percent; Spanish: 2.50 percent; British: 2.40 percent; Swedish: 2.40 percent; Dutch: 2.20 percent; Danish: 0.70 percent; Irish: 0.25 percent.

Economic Impact

Arianeespace clients are located throughout the world:

- the European Space Agency
- Arabsat (the Arab League)
- Aussat (Australia)
- Federal Ministry for Research and Technology (BMFT) and Federal Ministry for Post and Telecommunications (BMPF) (FRG)
- National Center for Space Studies [CNES] and General Telecommunications Directorate (GDT) (France)
- Embratel (Brazil)
- Eutelsat (European Telecommunications Organization)
- GTE Spacenet Corporation (United States)
- Inmarsat (International Organization for Maritime Communications)
- Intelsat (European Telecommunications Organization)
- Satellite Business System (United States)
- Swedish Space Corporation (Sweden)

Firm contracts have been signed (34 satellites, including 10 already launched) for a total of some 50 billion Belgian francs (44 percent for non-European customers). Arianeespace also has 17 options.

In 1985, the price of an Ariane 3 launch ranged from $25-30 million per satellite.

More than 6,000 people are currently working on the Ariane program. This figure should rise to 10,000 by the end of the decade.

Achievements and Outlook

Since its first launch in 1979, the Ariane line has grown to include three different models of the launcher: Ariane 1, 2, and 3. Ariane 4 is currently in development.

The decision to develop the next generation of Ariane launchers--the Ariane 5--by 1995 was made on 31 January 1985.

Eutelsat

Objectives

Eutelsat's primary purpose is to design, develop, build, install, operate, and maintain the space component of the European satellite telecommunications system(s). To this end, Eutelsat's first goal is to provide the space products and services necessary for public telecommunications.

Economic Impact

The organization itself employs some 150 people. Eutelsat allows several million users to benefit from a modern and reliable communications system. Practical applications are numerous: telephony, television, high-speed data transmission, remote text processing, remote printing of newspapers, teleconferencing, remote management of unmanned equipment.

Achievements and Outlook

The first Eutelsat satellite, ECS-1, was launched in 1983; the second, ECS-2, in 1984. The launch of ECS-3 in September 1985 failed. The launch of ECS-5, initially set for 1989, could be rescheduled for 1987. A timetable has been drawn up for a second Eutelsat generation: Eutelsat-Eutelsat 2 satellites. The first of these satellites should be ready for launch in 1989.

Preliminary studies have begun on the specifications of a satellite line to replace the Eutelsat 2 series during the 1990's.

Eumetsat

Objectives

The installation, maintenance, and utilization of operational European meteorological satellite systems, whenever possible in conformance with the recommendations of the world meteorological organization.

Economic Impact

The Meteosat program benefits several economic sectors: fishing, water management, agriculture, transportation, public works, and earthquake and volcanic eruption forecasting. Meteorological data are transmitted to various countries in Africa and the Middle East.

Achievements and Outlook

The first phases of an operational program (a follow-up to the preoperational Meteosat program) were implemented through the European Space Agency Convention. Three operational satellites will be launched in 1987 (MO1), 1988 (MO2), and 1990 (MO3). They will remain in operation until 1995.

Apollo

Objectives

The goal of Apollo (Article procurement with local on-line ordering) is to develop an advanced system for satellite transmission of data (Eutelsat ECS satellites).

Description

A pilot project developed by 10 ESA member states (Belgium, Denmark, FRG, Ireland, Italy, Norway, Spain, Sweden, Switzerland, the UK) with the collaboration of the DG XIII (information and innovation market) of the Commission of the European Communities.

Economic Impact

The Apollo program constitutes an important stage in the evolution of electronic document transmission in Europe. The system's principal users will be the PPT's [Post, Telegraph, Telephone], documentation centers, and the Commission itself.

Achievements and Outlook

Commercial use of Apollo is scheduled to begin in 1987.

The European Particle Physics Laboratory

Objectives

CERN [European Center for Nuclear Research] (European Particle Physics Laboratory) is the organization ensuring collaboration between European nations for purely scientific basic nuclear research as well as for other directly related research. The organization conducts no research for military applications, and the results of its theoretical and experimental research are published.

CERN provides European physicists with particle physics research facilities that could not be independently provided by the separate resources of each individual nation.

CERN is also the principal European center for basic research on the composition of matter.

CERN has 13 European members: Austria, Belgium, Denmark, France, FRG, Greece, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland, and the UK. Three countries are observers: Poland, Turkey, and Yugoslavia.

Member states make contributions based on their net national revenues.

Fields of Activity

According to the CERN Convention, its activities are to include:

- Operation of the 28-GeV proton synchrotron (PS) (in service as of 1959) and the 600-MeV synchrocyclotron (SC) (in service as of August 1957);
- Construction and operation of intersecting storage rings (ISR) connected to the PS;
- Construction and operation of a proton synchroton of some 300 GeV (now the 450-GeV SPS), put into service in 1976.

These are particle accelerators providing the high energy particles necessary for experiments; the primary characteristic of an accelerator is the maximum energy level to which it can accelerate particle beams. This energy is expressed in electron volts (eV), a unit equal to the kinetic energy acquired by a single charged particle subjected to a 1-volt change in power.

On 3 October 1981, the CERN Council unanimously approved the LEP (Large Electron-Positron) project for a large electron and positron collider. LEP will be a one-of-a-kind instrument, the most advanced probe for exploring the very core of matter. The expected results of this study are of great importance. The LEP looks like a ring placed in a tunnel 27 km long and 38 m in diameter, extending across the Franco-Swiss border at a depth of 50 to 170 m. Engineering work for the project began in summer of 1983.

Experiment Schedule (experiments in progress or in preparation as of January 1985):

- on the SPS: 14 in progress, 10 in preparation;
- on the SPS/pp: 4 in progress, 1 in preparation;
- on the PS: 1 in progress, plus Lear (17 experiments);
- on the SC: 9 in progress, plus Isolde (13 experiments);
- for the LEP: 4 experiment facilities in preparation.

Number of universities and institutes participating in the experiment program: 195.

Number of physicist-experimenters participating in the program: 2,506.

CERN is an outstanding example of international scientific collaboration. The convention governing CERN's operation is flexible in order to encourage full cooperation and to ensure adaptability in structuring its research.

Belgium's participation in CERN comes to 3.93 percent.

Achievements and Outlook

- Primary economic impact: innovations such as the production of new energy sources, telecommunications satellites, etc.;

- Secondary economic impact: resulting from its purchase of equipment from industry;

- Multiplier effect: resulting from all public investment which boosts demand for goods.

A sample of 160 companies selected from a total of 519 high tech manufacturers has been polled to measure the economic stimulus to high tech manufacturers from their sales to CERN during the period 1973-1987.

CERN purchases totaling 748 million Swiss francs generated a total of 3,107 million Swiss francs in economic activity (including estimates through 1987). It is estimated that by 1987, CERN's 1973-1982 high tech equipment purchases will have generated an economic benefit equivalent to some 60 percent of the organization's total costs for that period.

In 1982, approximately 75 percent of industry's CERN-stimulated revenue increases came from sales in sectors unrelated to particle physics, especially railroads, shipbuilding, refrigeration, production and distribution of electricity, and medicine.

The CERN is at the forefront of international high energy physics. International collaboration, an essential component, improves chances for understanding between scientists from various countries with different economic, social, and political systems. CERN, which stimulates so many industrial areas, offers excellent training opportunities for scientists and technicians; certain training programs have thus been expanded, sometimes through bilateral agreements with member states.

Superphenix-NERSA

Objectives

Commercial operation of a 1,200-Mw fast-neutron breeder reactor station for the production of electricity.

The owner-operator of the Superphenix--that is, of the nuclear breeder reactor in Creys-Malville, France--is the European Fast-Neutron Nuclear Power Station (NERSA), a consortium of three European electricity producers: French Electricity Company (EDF), National Electrical Energy Company (ENEL) of Italy, and Fast Breeder Reactor Nuclear Power Corporation (SBK) of the FRG, Belgium, the Netherlands, and the UK. Capital is divided as follows: 1 percent EDF, 33 percent ENEL, and 16 percent SBK.

Economic Impact

Compared to reactors currently on the market, breeder reactors permit a far more efficient use of fuel, with a more than 50-fold increase in energy yield.

Industrially, the Superphenix is the result of collaboration by several EC electric companies for the construction and operation of a large, high tech nuclear plant. Moreover, a special intra-Community structure was set up for the plant project.

Airbus Industrie

Objectives

To strengthen European collaboration in civil aeronautics manufacturing in order to compete against the "American Giant."

To take advantage of opportunities arising in one of the fastest developing industries in the world.

Airbus members are: SNI Aerospatiale SA (France), Deutsche Airbus GmbH (MBB) (FRG), British Aerospace PLC (the UK), Construcciones Aeronauticas SA (Spain).

Associate members: Fokker NV (the Netherlands) and Belairbus (Belgium).

Subsidiaries: Aeroformation Airbus Industries of North America, Inc.

In addition, Airbus has collaboration agreements with 25 countries around the world.

Economic Impact

Airbus Industrie, together with its subsidiaries, employed 1,301 people (late 1983) and had created employment for 50,000 skilled workers in many companies throughout Europe.

Airbus Industrie has sold more than 420 aircraft since its products first appeared on the market (for an approximately value of over 900 billion Belgian francs). At its present stage of production, Airbus Industrie has developed a customer base of 53 airlines and has become the leading vendor of two-aisle twin-jet aircraft throughout the world, excluding North America.

EUREKA

Objectives and Description

By strengthening high technology research cooperation between industry and research institutes, EUREKA's objective is to increase the productivity and competitiveness of national European economics and industries on the world market, thus consolidating conditions for long-term growth and employment.

Technology exchange between European industry and research institutes is planned in order to ensure an advanced level of technology in European industry. The goal of the EUREKA projects is to encourage and enlarge this exchange.

EUREKA projects must meet the following criteria:

- Conform with the above-mentioned objectives;
- Be jointly undertaken by participants (companies, research institutes) from more than one European country;

- Potentially offer substantial profits as a result of their joint achievement;
- Involve advanced technologies;
- Represent significant technological progress for the product, procedure, or service in question;
- Be carried out by participants with sufficient technical and administrative qualifications;
- Involve sufficient financial contributions by the participating companies.

EUREKA projects are planned through intensive exchange of information among companies, research institutes, and, if necessary, potential users. Therefore, the establishment of forums for industrial exchange in certain sectors could prove useful for identifying possible EUREKA projects.

Governments and the EC Commission will encourage the exchange of information in order to keep all interested parties informed of new projects planned.

EUREKA projects will be selected after consultation with the various partners involved. Participating companies and research institutes will themselves determine the distribution of tasks.

The governments of the countries of companies and research institutes participating in an approved project and, if necessary, the Commission of the European Communities, will verify the project's conformance with the objectives and criteria set for EUREKA. They will then jointly inform the EUREKA Ministerial Conference through senior officials when they are in session. Such a presentation would include a project description, analysis of its conformance with the objectives and criteria of EUREKA, and mention of any additional measures involving third parties. Projects requiring such additional measures could be discussed by the senior officials whenever one of them requests it. Procedures will be examined in light of experience to date.

Eureka projects are not meant to replace current European technological cooperative efforts, such as the programs of the European Communities, COST [European Cooperative of Scientific and Technical Research], CERN, or ESA, or projects involving bilateral or multilateral cooperation; nor should they prevent future cooperative development. On the contrary, their goal is to prolong or complement such work.

The European Communities as such can participate as partners in EUREKA projects, for example, through their own research facilities, R&D programs, and funding structures.

Fields of Activity

EUREKA should allow Europe to master and utilize technologies vital to its future and to develop its capacity in essential areas by encouraging and helping to strengthen scientific, industrial, and technological cooperation on projects oriented toward development of high technology products, systems, and services with a potential worldwide market.

At first, EUREKA projects will give priority to products, training and telecommunications, robotics, materials, automated manufacturing, biotechnology, marine technologies, lasers, environmental protection technologies, and transportation.

EUREKA will also include large scale R&D projects in the high tech fields, which aim at creating a technological base for a modern infrastructure and overcoming transborder problems.

EUREKA is for all qualified organizations, including small- and medium-sized companies and small research institutes.

25054/12781
CSO: 3698/A088

PRACTICAL ISSUES ADDRESSED AT DECEMBER EUREKA CONFERENCE

Frankfurt/Main FRANKFURTER RUNDSCHAU in German 18 Dec 86 p 2

[Article by Hannes Gamillscheg: "No Participation in Eureka by Eastern Europe For Now. Technology Program To Be Expanded by 40 Research Projects. Conference in Stockholm"]

Copenhagen, 17 Dec--Eureka, the European project for technical and scientific cooperation, will for now remain made up solely of Western European nations. As Sweden's minister president, Ingvar Carlsson explained on the occasion of the 4th Conference of Eureka Ministers in Stockholm, it is not now possible to expand the circle of member nations despite strong interest in Eastern Europe. There was, however, no objection to participation by Eastern European nations in individual, concrete Eureka projects, said Carlsson.

In addition to the 72 projects supported to date, 40 new research projects were approved at the Stockholm Eureka conference. The interest which Eureka has generated in industry was described as surprisingly great by conference participants from all 19 member nations. The original scepticism had largely disappeared, it was said. A critical observation, however, was that in numerous projects mostly large concerns were involved. In the future it would also be important to include small- and medium-sized companies in these cooperative efforts. "Working together," said Carlsson, "European industry has a major opportunity to overcome the technological threat coming from the United States and Japan."

At the focal point of the discussions in Stockholm was the removal of technical trade barriers to products developed within the scope of the Eureka project. These barriers--i.e. different safety standards or regulations on standardization--were described as a serious handicap for European industry in its struggle against the technical superpowers. It was said at the conference that industry and not governments should play the lead role in Eureka's cooperative efforts, although governments must provide the structural framework for fruitful cooperation. Representatives of the host nation, Sweden, expressed a desire for an increased dialogue with the European unions during the next phase of Eureka. Eureka's chairmanship will pass in January from Sweden to Spain.

According to the DPA, the 31 current projects involving German participation represent a financial volume of about DM 2.2 billion whereby the research ministry will make about DM 518 million available by 1993. Eleven universities, 22 other research institutes and 66 industrial firms, including 15 small- to medium-sized enterprises, are working on these projects.

Among these projects, for example, is the "factory of the future" project which is intended to investigate the possibility of the systematic use of computers and the structuring of a "computer hierarchy" for companies within an entire production sector.

In general, the laser, information science and materials research sectors are at the forefront of these projects. Still needed is for FRG research minister Heinz Riesenhuber to become more involved than he has to date in international cooperation on marine research.

12552
CSO: 3698/276

SWEDEN: GOVERNMENT RESEARCH BUDGET BIGGEST SINCE 1950's

Stockholm DAGENS NYHETER in Swedish 2 Feb 87 p 7

[Article by Lilian Ohrstrom]

[Text] On 19 February the government will present its anxiously awaited research proposal. DAGENS NYHETER is able to present its contents today. The government has not invested so much in research since the fifties. It is proposing an additional 360 million--230 million of this as early as the 1987/1988 fiscal year.

Positions will be established for 700 doctoral candidates. Positions are recommended for 225 new research assistants, in order to guarantee growth until the day when a large number of professors retire. Also to be established are 61 new professorships.

Basic funding for institutes will also be increased significantly. The regional technical universities will also be given a steady source of income for research. The banks have promised to provide 600 million kronor for equipment over a 3-year period.

Basic research at the universities and technical institutes will also receive additional support. But will this be enough to create a balance between basic research and the applied research that is financed by various private sector organizations and businesses?

Some people have called on the government to transfer research money from other ministries to the technical institutes. The research proposal does not go this far. The government is not abandoning the sector principle, according to which "each sector of society should support its own research in order to gain knowledge on which national political decisions can be based."

Harmony

The prime minister believes that the present model, with interplay among the universities and technical schools with steady resources for research, industries that need development work, and the organizations in the public sector (various agencies) that finance research at the universities, provides a "harmonious and effective model."

Nevertheless, the prime minister believes that the public sector must strengthen the technical universities by assuming more responsibility for basic costs. This trend began with the 1984 proposal. More research projects have been financed over longer periods of time.

Like the previous proposal, this research proposal will not force the public sector to do anything, but recommends that it finance services in conjunction with the establishment of research programs.

Which areas of research are prioritized in the 1987 research proposal? Some of these areas are the humanities, biotechnology, information technology, and the environment.

New positions and sharply increased basic resources will be provided for the humanities departments.

More research will be done on improving working conditions. Two new professorships will be established in economics that will specialize in labor market policy and, in particular, in evaluating the effects of labor market policy decisions. Much more research will be done on how occupational injuries occur and how they can be prevented. The research section of the National Board of Occupational Safety and Health will be given the status of an independent institute.

The Center for Occupational Studies that was founded in 1977 was quickly evaluated by the National Accounting and Auditing Bureau last fall and the Labor Ministry has not yet decided whether this institution will be reorganized. The prime minister is calling on the universities to show more interest in occupational research.

Environmental research will gain a firmer foothold at the universities through the establishment of several permanent research positions.

Some of the areas that will receive more resources are research in air pollution, forestry, sea pollution, traffic, and food quality.

Information

Information technology is seen as a key area that will be of decisive significance for other branches of industry. New professorships will be established for the systems-oriented section of the national information technology program.

Linkoping University will receive funding to construct a special research program for industrial information technology.

Biotechnology is a growing area of research with great potential. Microorganisms and cell and tissue cultures are used to produce food, pharmaceuticals, chemicals, energy carriers, and new types of plants.

Competence in biotechnology will be strengthened through increased appropriations to the Research Council for Natural Sciences, the Medical Research Council, and university faculties.

A center for plant genetics will be established at Sweden's University of Agriculture. A professorship in forest-related cell biology will also be established there.

A new polar research program is also proposed. The Research Council for Natural Sciences will be primarily responsible for this research.

Several million will be given to handicap research and an independent foundation for futurological research will be established outside the Coordinating Board of Swedish Research Councils.

International cooperation will be strengthened through additional resources for individual institutions, but also through special programs.

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CSO: 3698/253

STATE OF INFORMATION TECHNOLOGY IN ITALY

Milan AUTOMAZIONE E STRUMENTAZIONE in Italian Sep 86 pp 117-119

[Unsigned article: "Computer echnology and eleprocessing: the Assinform Diagnosis"]

[Text] At a meeting in Milan, Assinform presented its "1986 Report on Information Technology in Italy". On the theme of the meeting 'Information technology: a factor for transforming society in Italy' spoke Ottorino Beltrami, president of Assolombardia; Giancarlo Mazzocchi, coordinator of Progetto Milano; Pier Luigi Torrani, president of IReR; and Giorgio Pacifici, from the Observer Committee on EDP and Teleprocessing of the Council of Ministers.

The report data on the situation of information technology and teleprocessing in Italy were presented by Giancarlo Capitani of Nomos Sistema, and by Francois de Brabant of Reseau, the two research companies who collaborated in making the report.

The market situation--In 1985 the information technology market experienced an increase of 25.3 percent in terms of gross receipts, slightly lower than the 1984 increase.

The software and service sector represents 33.7 percent against 31.8 percent in 1984, while hardware has decreased from 68.2 percent to 66.3 percent.

In terms of current price value, the Italian computer market has reached in 1985 the total value of 9,650 billion lire, versus 7,700 billion in 1984. The hardware share has a market value of 6,400 billion lire, while software and services have a value of 3,250 billion lire.

As is evident from the above data, the Italian computer market, the fourth largest in Europe, has achieved considerable proportions; measured in terms of gross national product, the total expenditures for computer products and services were 1.25 percent in 1984 and rose to 1.41 percent in 1985.

Production and employment--The general favorable growth of the sector during 1985 is substantiated by the growth of production of EDP systems and office equipment which grew in value by 36 percent relative to 1984.

Employment in the sector has also shown a positive growth with an estimated 5.5 percent increase relative to 1985.

Import-export and trade balance--During 1985 the balance of payments for Italy in the office and computer equipment registered a negative balance of 1,102 billion lire, a decrease of 5.8 percent relative to 1984 when the negative balance amounted to 1,178 billion. Exports have risen 55.7 percent in value, at a rate considerably higher than the imports (+36.3 percent).

Personal computer market--The personal computer sector registered a good growth rate (+63 percent in volume) with about 150,000 units sold relative to 92,000 in 1984; this is the opposite to what is being experienced in more mature markets such as in the United States.

The home and personal computer market in 1985 shows how in Italy the process of mass introduction of computers is reaching the end of an expansion phase and is entering an intensification phase characterized by an increase in power and capabilities of the installed systems.

Network and services development--The telecommunication situation in Italy is characterized by a delay in investments in specialized networks and new teleprocessing systems. This is explainable mostly by the peculiar institutional structure of national telecommunications, characterized by five bureaus controlling the network and services, and their recent financial problems caused by the complex mechanisms for revising basic service rates. These problems have resulted in a delay for public videotext and teletext services and in the small munber of present and future users of thes services relative to other European countries;

additionally, they have contributed to the slow start of the data packet network Itapack, are a burden to the users, and slow down the full utilization of new technologies in their professional activities.

The programmed structural reform contained in the proposed bill prepared by minister of Postal Services and Telecommunications Gava, should put an end to the many bureaus, but has difficulty in being implemented and, in any event, won't give any results before 5 years.

Hindrances to development--The main hindrances to the development of the teleprocessing market in Italy are a lack of policy in industry focusing on this sector, and a pricing system which penalizes business use and many new services. Additionally, there is a lack of specific regulations governing the relationship between the government bureaus and other companies regarding those products and services which have been put on the free market.

Obviously, the government should have the most important role in removing these hindrances, but also the free market can play a role in defining the standards, market policy, products, and in the shaping of human resources.

Teleprocessing companies and areas of greatest development- There are 55 companies that offer teleprocessing equipment on the Italian market and are engaged in either production or marketing; all offer mre than one product or service. The sector with the most companies is that of personal stations and interconnected systems (18 and 19 respectively), while there are only two companies offering teleprocessing services to the medical and hospital community, and six offering videolento [slow-video].

Companies offering added value services have recently appeared in the market; these are hardware and software companies, financial services companies, information companies, and marketing companies.

Among the more interesting applications for Italian teleprocessing, considering the structure of our economic and production systems, are electronic money transfer, tourism, and teleprocessing within the national territory- which lends well to homogeneous cultural areas of which Italy is well endowed.
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13120
CSO: 3698/265

FRAGMENTATION HINDERS CAD/CAM PRODUCTION IN ITALY

Milan AUTOMAZIONE E STRUMENTAZIONE in Italian Sep 86 p 150

[Text] The importance of CAD/CAM in the process of industrial automation is unquestionable. Italy too has rapidly aligned itself to the world trend, even though it doesn't possess a structure suitable for absorbing such technological innovations.

These evaluations are by Reseau whose predictions for 1986 indicate a smaller rate of increase, around 30 percent. The spreading of computer aided design and mechanization (CAD/CAM) in the framework of Italian industry has taken place in Italy with exceptional and unexpected rapidity in the last three years, considering the chronic lateness of introducing these technologies in the 70s and the early 80s.

Today this market has grown and diversified into new applications and different size companies: 50 percent of the new users projected for the 1985-90 period, for example, consist of companies not over 100 employees, while already over one third of CAD/CAM work stations are placed in sectors other than the traditional mechanical and electronics applications.

If one considers mechanical and electronics companies as the major users, CAD/CAM investments in 1985 were about 2.5 percent of their total computer investments (hardware plus software).

Therefore, while CAD/CAM is still a minor share of the total Italian computer market, it represents today a consistent and growing share of the demand from the most advanced industrial sector, which with integrated factory automation, is one of the more formidable businesses of the 90's (CAD/CAM is about one-third of the total factory automation business, worldwide).

It is therefore alarming that the growth of CAD/CAM demand in Italy was not accompanied by a parallel growth of an Italian industry in this sector of national and international importance. Today, the Italian market is dominated by IBM, Computervision, and Calma, which together share about 35-40 percent of the market. These are followed by about 15 other companies, mainly American, each with a one to five percent share of the market. In total, 17-18 companies control 85 percent of the market; the rest is subdivided among an evergrowing multitude of other companies which furnish hardware, software, and systems. Among the first 20 companies only four are Italian: Selenia Autotrol, Cad Lab, Olivetti Tecnost, and Eurobit.

Such strong fragmentation of companies (the Italian CAD/CAM market is the least homogeneous in Europe) is partially explainable by the recent growth of demand and requirement diversification in applications demanding high specialization from suppliers, especially in software. This is a situation which may linger for a little longer, if for no other reason that spontaneity will decrease and the necessity to integrate and consolidate diverse know-how.

13120
CSO: 3698/265

FIAT'S PLANS FOR ALFA-LANCIA UNIT DETAILED

Turin ILLUSTRATOFIAT in Italian Nov 86 p 3

[Unsigned Article: "The Fiat-Alfa Plan"]

[Text] Alfa will go to Fiat. The decision was taken on the sixth of November by the administrative council of Finmeccanica convened in Rome in the morning, and then approved by the IRI administrative council on the afternoon of the same day.

The offer from our company was deemed better than that made by Ford. The announcement released by Finmeccanica at the end of the first meeting says: "The administrative council of Finmeccanica company, having met this morning, has examined the evaluations of the proposals made by Ford and Fiat regarding Alfa Romeo. The council has unanimously decided to accept the Fiat proposal, since it is more advantageous for Finmeccanica." The council decision was transmitted to IRI who, in a following meeting, approved it.

The formal transfer of Alfa was then approved by CIPI [Interministerial Committee for Industrial Policy Coordination].

"We at Fiat," declared the managing director Cesare Romiti, "have learned the news of the choice with a deep sense of responsibility for two reasons: first, because the large project contained in our proposal requires an enormous effort in terms of human and financial resources. It is a lengthy, expensive, and extremely engaging program which aims at gaining for the Italian automotive industry a role of primary importance in the sector of automobiles of prestige. The second reason and

responsibility will be to maintain and increase the international prestige of the Alfa Romeo trade name, and thus keep alive one of the best traditions of our automotive history."

"In brief," continued Romiti, "only from the cooperation of all the Alfa Romeo and Fiat workers can we achieve the corporate spirit necessary for the full success of the project. But the problem cannot be resolved only with the resources within the companies. We also need the support of the country, because the ultimate purpose is the advancement of the Italian economy."

"As 1987 begins," said Vittorio Ghisella, managing director of Fiat Auto, "a detailed process for getting to know Alfa Romeo will get under way. Its purpose is to achieve the necessary integration between processes, production, and workers. The Fiat management is aware of the complexity of the operation and the magnitude of the challenge undertaken. The management is, nevertheless, confident of success, and will work toward this goal, benefitting from the experience gained in the difficult years of crisis when,through very hard daily work, it was able to bring the company to the forefront of the European market."

Let's now take a look at the Fiat plan which has been discussed and consequently approved by Finmeccanica and IRI.

A new company--A new company will be formed to encompass all the activities of Lancia and Alfa Romeo and will be headed by Fiat Auto. Fiat has acquired all the stocks held by Alfa and will invest a total of 5,000 billion [lire], half of which will go toward the restructuring of the factories, and half toward product renewal.

Sales--once established, the new company will produce 620 thousand vehicles per year, subdivided as follows: 320 thousand with the Alfa Romeo trademark, 265 thousand with the Lancia trademark, and the remaining 35 thousand will be produced for third parties. The Alfa factories will reach complete saturation at a production of 395 thousand vehicles.

Strategies--Fiat's effort is motivated by the fact that the European market for autos with large engines is increasing and will continue to increase in the next three years. A high production base would permit the new company to be very competitive in a

particularly interesting market. The Alfa Romeo trademark will be exploited to the fullest. The proposal, in fact, foresees two lines of products independent of each other and with separate sales networks. Alfa Romeo will produce high-performance luxury models with sport car features, while Lancia will produce luxury models of classic lines. Lancia will keep unchanged its own development plan.

The work force--The Fiat proposal foresees full exploitation of the Alfa management and technical capabilities in all sectors. "Alfa Romeo," said Romiti, "has high capabilities, and above all, high company pride. We intend to exploit fully these capabilities." By 1990, all employees that have been laid off and are on unemployment benefits will be rehired. Excessive personnel, which afflicts only Alfa Romeo, will be dealt with by natural turnover and incentives for early retirement. By 1990, the new company will have 37 thousand employees, of which 28 thousand will be at the Alfa factories and 9 thousand at Lancia.

The models--By 1990 Lancia will produce the Y10 of Autobianchi, the new Delta and Prisma, and the Thema on which will also be installed the six-cylinder 3000 cc motor built by Alfa Romeo. The Alfa models, by the same year, will include a new 33, a new 75, the 90, the 164, new sprint models, a new coupe', the AR 148 all-terrain vehicle designed by Nissan, a passenger minibus, and a commercial vehicle.

The motors--The 'boxer' and the six-cylinder will be further developed. The latter, with the appropriate modifications, will be mounted on both Alfa and Lancia models.

The American market--The new company will export to the US 50-60 thousand vehicles, to be marketed through an existing network already operating in that market.

This is essentially the Fiat plan selected by Finmeccanica and IRI. The Fiat proposal should be interpreted as a strategic move of industrial politics, which aims at consolidating and developing the national auto industry, and use its managerial, technological, and positive image assets. It originates from and is within the realm of a positive development of the auto market and the sound financial and economic situation of the Fiat consortium.

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CSO: 3698/265

BRIEFS

ITALIAN POLICY ON AIRCRAFT INDUSTRY--Rome, 22 September 1986. The parliamentary inquiry on the aircraft industry ended without accomplishing anything. The idea of forming a public company in which Aeritalia and Agusta would merge caused a real break among the members of the government majority. The lengthy document approved by the Budget, Defense, and Industry committees of the Chamber, limits itself to a generic statement concerning the necessity of concentrating the public companies in a single stock company, but it doesn't specify which one. The proposition supported by the DC, PCI, PRI, and PLI, to constitute within six months the merger under the control of a financial branch of the IRI, appears in the final document only as 'an opinion widely supported', since the Socialists and Socialdemocrats--contrary to this solution--have claimed that a preliminary investigation cannot conclude with a specific recommendation politically binding for the government. The political battle which has long been raging around Italian aircraft industries is, therefore, destined to continue. [Text] [Milan TELEMATICA 2000 in Italian 18-22 Sep 86 p 3] 13120

ITALY: LARGEST EUROPEAN EXPORTER OF PLANTS--"In 1985 Italian companies building plants have grossed outside of Italy over 3,300 billion lire just from 'turn-key' plants. This is lower only to US and Japanese competitors, and higher than other European countries." So declared Raffaele Picella, president of Italimpianti of the IRI-Finsider group, at a conference on the financial aspects of plant design outside Italy which took place in Rome at the center for advanced studies for the Ministry of Defence. After referring to the commission obtained by Italimpianti in the Soviet Union for building the most modern pipe factory in in the world at Volski, Picella stated that in the last few years the market for plant building has been characterized by lack of

growth due to reduction of loans to developing countries and median income countries. Such lack of growth was also accompanied by increased competition from countries which until now had been on the sidelines of the export market. "This crisis situation," said Picella, "can become more acute for Italian companies whose foreign business is projected to be more than 80 percent.[Text] [Milan TECNOLOGIE MECCANICHE in Italian Dec 86 p 71] 13120

CSO: 3698/265

USE OF COMPUTERS BY GDR STUDENTS

East Berlin TECHNISCHE GEMEINSCHAFT in German No 12, 1986 pp 17-18

[Article by G. Peissker, doctor of sciences: "Students Learn With Computer Aid"; first paragraph is TECHNISCHE GEMEINSCHAFT introduction]

[Text] For the first time as they take up their study at universities and advanced schools in our republic more than 75,000 students in all disciplines are being introduced to computer science from the very 1st year of their studies. An understanding of the problems of computer science joined to capacity and readiness to use it is for engineers and economists an essential prerequisite for the effective use of computer technology in all branches of the national economy.

On the basis of experience gained in recent years and months a new quality of education is being introduced in the student year 1986/87 at universities and advanced schools. This new aspect of education provides the necessary scientific preliminaries for the use of computers in the national economy, especially in CAD/CAM projects.

In this process attention is focused on integration of computer science and work with computers into the total process of studies.

Training in the domain of computer science is accomplished in the first place within the context of those foundational studies of computer science which have already been introduced. To support these foundational studies there have been created computer science sections at various advanced schools and universities. For these sections the necessary basis in terms of instrumentation and cadres has been created in part by integrating the existing computer center. At other advanced schools the transition to computer science sections functioning as educational units is taking place over a longer period of time. This is being accomplished through the interim conversion of the computer center into a center for computer science having its own autonomous profile in continued education and research.

Secondly, computer science education is taking place in all other fundamental study areas with increased equipping of advanced schools and universities with modern computer technology, especially with minicomputers, office computers, and personal computers. The aim is to make students capable of recognizing

and mastering the computer as an effective working aid in support of intellectual work from the very beginning of their studies.

On this basis it is expected that the students in every discipline shall be able in varying degrees to solve their specialized problems with the aid of computers.

At the same time this constitutes a response to the objective requirement that the development and broad utilization of computer-supported technologies in intellectual work shall be not only a task for computer scientists but also shall be of concern to representatives of all specialized areas.

Drawing Closer Together

Central importance attaches to the computer science training of engineers and economists. The development of economics and the evaluation of scientific-technical progress demand that already in political economic training and continued education the foreground should be occupied by the automation of data processing and by mathematically supported perfection of decision processes in economics. Here the point of departure is microelectronics as a key technology in conjunction with the demand for the broad exploitation of microelectronics in economics. About 40 percent of this technology finds its effectiveness in computer technology and in its economic application. This technology makes possible a penetration of computer power into on-the-job application and thus has an effect upon job content and capability in the work of every economist.

Consistently with these new demands upon economists there is being created in the fundamental studies of political economy a three-stage program of computer science training at the universities and advanced schools.

For the economists in all areas this means education in the "foundations of political economic computer science." This fundamental training forms the basis of a thorough integration of computer science into political economic studies and for the application of computer science oriented toward practical tasks in the entire process of teaching and research. Graduates acquire the capacity to work as qualified users of computer aids and as potential developers of software.

They acquire applications-oriented knowledge relating to the following questions:

i. goals and focal points of computer use in the socialist economy;

ii. functions, elements, and structures of computer systems;

iii. program development in various programming languages (e.g., BASIC, PASCAL);

iv. data organization and data processing work;

v. computer use for standard tasks;

vi. development of user software;

vii. possible development directions for computer-supported systems as these are influenced by distributed information processing.

On the basis of knowledge acquired especially in relation to the construction of algorithms, the utilization of program generators and of a programming language in dialogue, and on the basis of knowledge about software development technology graduates in all specialties in the field of political economy acquire certain capabilities and skills. These are skills in the utilization of programs in conventional and in dialogue operation, skills in the development of programs with limited functional scope on the basis of modern software technologies, and skills in the organization of computer-supported information processing for the job environment.

Independent laboratory work at the computer as a supplement to proven methods and forms of teaching has become an essential element of education.

In this way graduates are put in a position to become immediately active in the domain of computer utilization when they commence activity in industry.

Consistently with the requirement that user software shall be developed by the users 10 to 15 percent of the students in each specialty are trained in a "political economic computer science enrichment course." The training volume of educational activities specifically related to computer science amounts to about 20 percent of the total study time. The graduates of the enrichment course in computer science are to be employed with responsibility for rationalization in whatever special fields correspond to their own specialty.

Economists as Software Developers

Since September 1986 at four universities and advanced schools there has been taking place a still further degree of education in the use of computers in industry. This has been under the heading of "Computer Science in Industry." This is linked to the positive experience acquired in the former specialty entitled "Mathematics and Data Processing in Industry." What is involved here is advanced training of economics graduates as software developers for complex tasks in management, planning, control, cost accounting, and analysis of the production process. These graduates are to be employed in modeling groups and software development groups.

Industrial computer science is characterized qualitatively in particular by the two following aspects:

i. It combines the thorough interpenetration of economic investigations by mathematics and computer technology with training of students to independently develop software for economic tasks.

ii. As no other branch of political economy it is based upon interdisciplinary cooperation among economists and technologists and natural scientists in the domain of key technologies, namely microelectronics and its applications in industrial combines.

Industrial computer science encompasses the applications requirements, principles, organizational forms, and economic criteria of automated information processing in industry and also includes provision for the hardware and software aspects of computer-supported systems.

A theoretically based flexibly applicable practical political economic education in fundamentals includes instruction in the technical-technological principles of microelectronics and the mathematically oriented disciplines of mathematics for economists, statistics, and cybernetics. It is in part on this basis that there takes place parallel training in the foundations of applied computer science. Instruction is given to this end in the disciplines of computer science I, mathematical foundations of computer science, and computer science II (programming languages, software technology, computer systems, industrial systems, data banks, software tools) with a high fraction of attention being given to dialogue work at the computer.

This is linked to industrial computer science having a profile specifically adapted to advanced schools. Here the educational disciplines particularly deserving mention are: mathematical-cybernetic modeling, programming and simulation of economic processes; analysis and organization of computer-supported systems; work organization in computer centers; distributed data processing and computer networks; office automation; specialized languages; artificial intelligence.

As enrichment courses these and other advanced school-type educational operations are oriented toward computer-supported systems and their components in the applied domain. A central position is occupied by, amongst other things, computer-supported planning, disposition, control, and accounting, computer-supported information systems of industrial management, computer-supported jobs (e.g., inventory maintenance and cadre work), computer-supported production-plan optimization (CAP) and mutually integrated CAP/CAD/CAM projects.

Training at the computer is done in dialogue style using minicomputers, office computers, personal computers, and ESER computers.

A 1-year preliminary practical exposure before the beginning of studies and the occupational practical experience opportunities which accompany the studies are aimed at familiarization with hardware and software projects, independent development, economic evaluation, and introduction of user software. The educational goal of industrial computer science is overall creation of ability in system analysis, modeling and simulation for the development and evaluation of information systems, design and application of standard software and user software, utilization of information technologies and communication technologies (e.g., data bank technology and computer network technology, technology of programming, communication networks) in order to secure unity in organizational methodology in the various branches of the national economy and also unity in the design and selection of user software.

Training for Automated Information Systems

Education in industrial computer science is aimed at enabling its graduates to develop, introduce, utilize, maintain, and evaluate automated information systems, including corresponding user software for economic processes in the area of national economy, combine, and factory, including the intermeshing of several of these areas.

In this manner within the field of industrial computer science cadres are trained to deal with problem complexes such as the following:

i. the design of automated information systems in economic domains of application including their mathematical-economic, data-organizational, and performance-organizational modeling with the aid of specially developed and reusable user software and standard software (e.g., setting up an automated information system for planning, management, accounting, and analysis in a combine);

ii. construction and use of computer networks for tasks of orientation, information, planning, disposition, scheduling, and analysis in conjunction with office automation and text processing;

iii. development and use of data banks, model banks, and method banks for economic processes in the applied domain (e.g., the use of data banks and expert systems);

iv. design and implementation of problem-oriented standard software and user software, its care and maintenance for economic tasks and processes such as the planning of production, sales, material procurement, and finance as well as in statistics;

v. efficiency calculations for various organizational forms, technologies, methods, and procedures in applying modern information technologies and communication technologies;

vi. evaluation and selection of software products and performance of adaptation activities relating to the specific requirements of particular areas of use (e.g., selection of data bank, operating systems for use in economic areas within the province of combines and industries).

In order to respond to an urgent need in the practical field the universities and advanced schools have been assigned the task of making scientific expertise in the domain of industrial computer science rapidly effective and purposeful also within the context of continued education. Of special importance are short-term continued education courses or training courses which teach the most recently acquired theoretical knowledge and its applications to the computer-supported work done by economists for their partners in various applied activities. Up to now proven value has been found in advanced school education ranging from training courses lasting several weeks to user consultations lasting for 1 day, but there has also been value in joint research and applications groups involving representatives of advanced schools and industry, supported by agencies of the KDT, in which cadres of practical workers receive continued education.

8008
CSO: 2302/21

HUNGARIANS DESCRIBE NEW FFT PROCEDURE WITH TRANSPOSED TRANSFORMATION

Budapest HIRADASTECHNIKA in Hungarian No 9, 1986 pp 397-398

[Article by Dr Tamas Henk, Telecommunications Research Institute, and Ferenc Leeb, Communications Engineering Electronics Institute of the Budapest Technical University: "New FFT Procedure With Transposed Transformation"]

[Text] Summary
Among the fast procedures suitable for calculating a DFT [discrete Fourier transform] the article describes a new procedure, starting from a Winograd type procedure, for factorization of the matrix of a discrete Fourier transform. First it describes the Winograd algorithm; after describing the mathematical method it introduces factorization of the DFT matrix with transposed transformation. It points out the link between the resolution of the DFT and the IDFT [inverse discrete Fourier transform], and then takes up the possibility of introducing a new transformation. Finally small point number modules, given in an appendix, of a transposed transformation are compared to modules of the WFTA from the viewpoint of the operations needed.

1. Introduction

DFT is one of the favored procedures of discrete time signal processing for describing a series of finite length. By a 1-D discrete Fourier transform of a finite series we mean

$$X(k) = \sum_{i=0}^{N-1} x(i) \cdot \omega_N^{ik}, \quad \omega = e^{-j(2\pi/N)} \qquad (1.1)$$

The above equation can also be formulated in matrix form

$$X = D_N \cdot x, \qquad (1.2)$$

where

$$D = \begin{vmatrix} 1 & 1 & \cdots & 1 \\ 1 & \omega_N^1 & \cdots & \omega_N^{N-1} \\ 1 & \omega_N^{N-1} & \cdots & \omega_N^{(N-1)^2} \end{vmatrix}. \qquad (1.3)$$

For direct evaluation of an N point DFT we must perform N^2 complex multiplications and (N-1)N complex additions. This procedure is very time consuming so, exploiting the redundancy of the DFT, they have developed FFT (Fast-Fourier-Transforms) procedures to calculate it. One of these is the WFTA

procedure published by Winograd in 1975 which is based on breaking down the original D_N matrix in the form

$$D_N = S_N \cdot C_N \cdot T_N \qquad (1.4)$$

where C_N is a diagonal matrix of size (M*M) and S_N and T_N are matrices of size (N*M) and (M*N) respectively containing only 1, 0, -1 elements. In general M is greater than or similar to N so the number of multiplications needed to perform the DFT will be proportional to N. Winograd gave a resolution according to (1.4) optimizing separately for small point numbers, but the relationship to one another of the matrices figuring in the resolution are not known.

2. Factorization with a Row-Column Transformation
In this article we describe a factorization of the D_N matrix based on row-column transformation, having the form

$$D_N = L_N \cdot K_N \cdot L_N^T \qquad (2.1)$$

L_N is a matrix of size (N*N) containing only 1, 0, -1 elements and K_N is a quasidiagonal matrix of size (N*N).

a. Mathematical Foundations
On the basis of linear algebra performing row-column operations on matrix A of size (n*m) one can get a diagonal form D of the size (n*n). Putting it in the form of matrix multiplication there exist an S (n*m) matrix and a T (m*m) matrix such that

$$D = S \cdot A \cdot T. \qquad (2.2)$$

We should note that the resolution according to (2.2) is not unambiguous.

b. The Transposed Transformation Resolution of the D_N Matrix
Exploiting the fact that the transposed D_N matrix coincides with itself we make special use of a procedure for diagonalization in such a way that after a row operation we perform the corresponding column operation as well. At each step we are careful that the pre-ordering and post-ordering elements should only have values of 1, 0, -1; in the interest of this goal we must generally abandon having the K_N matrix be diagonal, contenting ourselves with the matrix in question being quasidiagonal. In this way the D_N matrix can be written in the form

$$K_N = M_N \cdot D_N \cdot M_N^T \qquad (2.3)$$

Since the M_N figuring in formula (2.3) is a nonsingular matrix of size (N*N) it can be inverted and we get a resolution of the form

$$D_N = M_N^{-1} \cdot K_N \cdot (M_N^T)^{-1} \qquad (2.4)$$

Since $M_N^{-1}=L_N$ formula (2.4) can be written in a form corresponding to (2.1). Inverting formula (2.3) in the resolution we get the formula

$$K_N^{-1} = (M_N^T)^{-1} \cdot D_N^{-1} \cdot M_N^{-1} \qquad (2.5)$$

Considering that the DFT and IDFT transforms create a pair, that is can be written

$$D_N^{-1} = \frac{1}{N} D_N^* \qquad (2.6)$$

we get the following formula from (2.5)

$$N \cdot (K_N^{-1})^* = M_N^{-1} \cdot D_N \cdot (M_N^T)^{-1} \qquad (2.7)$$

So the matrices figuring in (2.1) can be obtained without inversion simply from the resolution according to (2.7).

c. The Connection of the IDFT and DFT Resolutions
Inverting and ordering formula (2.7) we get the formula

$$D_N^{-1} = L_N \cdot (N \cdot K_N^*) \cdot L_N^T \qquad (2.8)$$

which gives the resolution of the IDFT. It can be seen that the transposed property remains and that the quasidiagonal matrix figuring in the resolution can be simply derived from the matrix figuring in the DFT resolution.

d. Introducing a New Transformation
On the basis of the foregoing an entire signal processing, filtering process can be formulated in the form

$$y = D_N^{-1} \cdot F_N \cdot D_N \cdot x \qquad (2.9)$$

where x and y are the column vectors of excitation and response time functions respectively and F_N is the diagonal matrix of size (N*N) expressing filtering. Using the resolution of DFT and IDFT according to (2.4) and (2.8) respectively in formula (2.9) we get the formula

$$y = L_N \cdot (N \cdot K_N^*) \cdot L_N^T \cdot F_N \cdot L_N \cdot K_N \cdot L_N^T \cdot x \qquad (2.10)$$

The F_N matrix modeling filtering can be reduced with D_N^{-1} and $L_N * K_N$:

$$y = H \cdot L_N^T \cdot x \qquad (2.11)$$

Thus it becomes possible to introduce a new transformation

$$z = L_N^T \cdot x \quad x = (L_N^{T-1}) \cdot z \qquad (2.12)$$

The L^T_N matrix contains only 1, 0, -1 elements, thus the elements of $(L^T_N{}^{-1})$ are derived as powers of 2 (Appendix 2), so the transformation can be carried out quickly without multiplications. The transformation is similar to the Walsh transformation used in digital image processing, its advantage is that it creates a direct link with the Fourier transform.

3. Small Point Number Modules

Using the procedure described above we determined the resolution of a D_N matrix in the case of 2, 3, 4, 5, 6 and 8 point numbers (Appendix 1). Larger point number modules can be derived from these in the way used in the WFTA procedure and smaller point number matrices can be derived as a Kronecker product.

a. A Comparison of the Small Point Number Modules of a WFTA and a Transposed Transformation

When evaluating the two procedures one of the crucial factors is the time necessary to calculate the DFT, often this limits the maximal signal processing frequency. The operation execution time can be estimated by the number of necessary multiplications and additions, so we compared the small point number modules of the two procedures from this viewpoint. Table 1 contains the number of necessary multiplications and additions.

Table 1.

	WFTA		Transposed Transformation	
N	Multiplications	Additions	Multiplications	Additions
2	0	2	0	3
3	2	6	2	6
4	0	8	0	8
5	5	17	5	17
6	5	18	5	16
8	2	26	2	29

4. Conclusions

From the viewpoint of operations needed the small point number modules of the two procedures do not differ significantly from one another. But the resolution obtained with the row-column transformation procedure creates a link between the pre- and post-ordering elements, for they are transpositions of one another. This offers a possibility for introducing a new transformation which might offer signal processing advantages compared to the Walsh transformation.

An Expression of Thanks

The authors express their appreciation to Dr Ferenc Kocsis (BME-HEI [Communications Engineering Electronics Institute of the Budapest Technical University] and TKI [Telecommunications Research Institute]) for making the literature available and to Dr Tamas Fulup (BME-HEI) who supported and monitored our work from the beginning.

Biographic Notes

Dr Tamas Henk graduated from the BME Electrical Engineering School in 1973. Since then he has worked at the TKI, presently as a scientific consultant. At the TKI he participated in the development of a data transmission modem family, computer aided design and the Intercsat space telecommunications equipment. His research areas are linear and nonlinear network theory, data transmission and digital signal processing. In 1977-79 he was a guest researcher at the Dublin University. He received his university doctorate in 1980 and since 1985 has been a candidate in technical science. He is chief of

the Space Telecommunications Equipment Department at the TKI and chairman of the Technical Sciences Committee in the HTE [Communications Engineering Scientific Association].

Ferenc Leeb is a graduating student at the Budapest Technical University. Since 1983 he has done science student club activity on MOS EC filters in the Circuits Department of the BME HEI. In 1984 his paper won first prize at the annual TDK [Science Student Club] Conference. His area of interest is digital signal processing.

Appendix 1.

$$D_2=\begin{vmatrix}1&0\\1&1\end{vmatrix}\cdot\begin{vmatrix}1\\0\end{vmatrix}\cdot\begin{vmatrix}0\\-2\end{vmatrix}\cdot\begin{vmatrix}1&1\\0&1\end{vmatrix}$$

$$D_3=\begin{vmatrix}1&0&0\\1&1&-1\\1&1&1\end{vmatrix}\cdot\begin{vmatrix}1&0&0\\0&-1.5&0\\0&0-j\sqrt{3}/2&\end{vmatrix}\cdot\begin{vmatrix}1&1&1\\0&1&1\\0&-1&1\end{vmatrix}$$

$$D_4=\begin{vmatrix}1&0&-1&0\\0&1&0&1\\1&0&1&0\\0&-1&0&1\end{vmatrix}\cdot\begin{vmatrix}1&0&0&0\\0&-j&0&0\\0&0&0&-1\\0&0&-1&0\end{vmatrix}\cdot\begin{vmatrix}1&0&1&0\\0&1&0&-1\\-1&0&1&0\\0&1&0&1\end{vmatrix}$$

$$D_5=\begin{vmatrix}1&0&0&0&0\\1&1&0&-1&-1\\1&1&1&1&0\\1&1&-1&1&0\\1&1&0&-1&1\end{vmatrix}\cdot\begin{vmatrix}1&0&0&0&0\\0&-a&0&0&0\\0&0&-jb&0&jd\\0&0&0&c&0\\0&0&jd&0&-jb\end{vmatrix}\cdot\begin{vmatrix}1&1&1&1&1\\0&1&1&1&1\\0&0&1&-1&0\\0&-1&1&1&-1\\0&-1&0&0&1\end{vmatrix}$$

$$a=5/4\quad b=\sqrt{10+2\sqrt{5}}/4\qquad c=\sqrt{5}/4\quad d=\sqrt{10-2\sqrt{5}}/4$$

$$D_6=\begin{vmatrix}1&0&0&0&0&0\\1&1&1&1&0&-1\\1&0&1&0&-1&-1\\1&0&0&1&0&0\\1&0&1&0&1&1\\1&1&1&1&0&1\end{vmatrix}\cdot\begin{vmatrix}1&0&0&0&0&\\0&3&0&0&0&\\0&0&-1{,}5&0&0&\\0&0&0&0&0&\\0&0&0&-j\sqrt{3}&0&\\0&0&0&0&-j\sqrt{3}/2&\end{vmatrix}\cdot\begin{vmatrix}1&1&1&1&1&1\\0&1&0&0&0&1\\0&1&1&0&1&1\\0&1&0&1&0&1\\0&0&-1&0&1&0\\0&-1&-1&0&1&1\end{vmatrix}$$

$$D_8=\begin{vmatrix}1&0&0&0&-1&0&0&0\\0&1&0&1&0&1&0&-1\\1&0&1&0&0&0&1&0\\0&-1&0&1&0&-1&0&-1\\1&0&0&0&1&0&0&0\\0&-1&0&1&0&1&0&1\\1&0&-1&0&0&0&1&0\\0&1&0&1&0&-1&0&1\end{vmatrix}\cdot\begin{vmatrix}1&0&0&0&0&0&0&0\\0&\sqrt{2}/2&0&0&0&0&0&0\\0&0&0&0&0&-j&0&0\\0&0&0&0&-1&0&0&0\\0&0&0&-1&0&0&0&0\\0&0&-j&0&0&0&0&0\\0&0&0&0&0&0&-2&0\\0&0&0&0&0&0&0&-j\sqrt{2}/2\end{vmatrix}\cdot\begin{vmatrix}1&0&1&0&1&0&1&0\\0&1&0&-1&0&-1&0&1\\0&0&1&0&0&0&-1&0\\0&1&0&1&0&1&0&1\\-1&0&0&0&1&0&0&0\\0&1&0&-1&0&1&0&-1\\0&0&1&0&0&0&1&0\\0&-1&0&-1&0&1&0&1\end{vmatrix}$$

Appendix 2.

$$(L_1^{T-1})=\begin{vmatrix}1&-1\\0&1\end{vmatrix}\qquad(L_2^{T-1})=\frac{1}{2}\begin{vmatrix}1&1&1\\0&1&1\\0&-1&1\end{vmatrix}\qquad(L_3^{T-1})=\frac{1}{2}\begin{vmatrix}1&0&-1&0\\0&1&0&1\\1&0&1&0\\0&-1&0&1\end{vmatrix}\qquad(L_4^{T-1})=\frac{1}{4}\begin{vmatrix}4&4&0&0&0\\0&1&0&-1&-2\\0&1&2&1&0\\0&1&0&-1&2\\0&1&0&-1&2\end{vmatrix}$$

$$(L_5^{T-1})=\frac{1}{2}\begin{vmatrix}2&2&-2&-2&0&0\\0&1&0&0&1&-1\\0&-1&1&0&-1&0\\0&-2&0&2&0&0\\0&-1&1&0&1&0\\0&1&0&0&-1&1\end{vmatrix}\qquad(L_6^{T-1})=\frac{1}{4}\begin{vmatrix}2&0&0&0&-2&0&-2&0\\0&1&0&1&0&1&0&-1\\0&0&2&0&0&0&2&0\\0&-1&0&1&0&-1&0&-1\\2&0&0&0&2&0&-2&0\\0&-1&0&1&0&1&0&1\\0&0&-2&0&0&0&2&0\\0&1&0&1&0&-1&0&1\end{vmatrix}$$

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CSO: 2502/21

HUNGARIAN WORK ON SYMBOLIC NETWORK ANALYSIS, ANALOG NETWORKS

Budapest HIRADASTECHNIKA in Hungarian No 9, 1986 pp 401-408

[Article by Dr Klara Csefalvay and Laszlo Kunsagi, Theoretical Electricity Faculty, Budapest Technical University: "Symbolic Network Analysis I; Continuous Time Networks"]

[Excerpt] Summary
The article describes a new method for generating symbolic and semisymbolic transfer functions and first order relative sensitivity functions of amplitude and phase characterstics of continuous-time, concentrated parameter, linear, time-invariant networks. The entire system of network equations is built up directly in the domain of Laplace transformation with the method of nodal analysis. Numeric codes are assigned to the parameters of the several network components and the system of equations is solved with the aid of the Sannuti-Puri algorithm for determinant exposition. The SYMBOL program system working on the basis of the method described was developed at the Theoretical Electricity Faculty of the BME [Budapest Technical University].

Biographic Notes
Dr Klara Csefalvay got her degree in electrical engineering at the BME in 1966. After graduation she went to the Electrical Engineering School of the BME and has since worked in the Theoretical Electricity Faculty. Her theoretical work is connected primarily with teaching; she guides the scientific activity of her students. Her chief area of interest is computer analysis of continuous and discrete-time networks and computer aided design of discrete-time networks.

Laszlo Kunsagi got his degree in electrical engineering at the BME in 1984. In 1982, as a university student, he prepared a scientific student club paper on symbolic generation of transfer functions and sensitivity functions of continuous-time networks. He won first prize with his paper and in 1983 participated in the Sixteenth National Scientific Student Club Conference. At present he is studying at the Theoretical Electricity Faculty of the BME on an MTA [Hungarian Academy of Sciences] TMB [Scientific Qualification Committee] scholarship. His chief area of interest is symbolic computer analysis of digital filters and a study of their sensitivity properties and possibilities and problems for their realization.

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CSO: 2502/21

HUNGARIAN EXPERIMENTS WITH INTRINSIC GETTERING IN SI-WAFER TECHNOLOGY

Budapest HIRADASTECHNIKA in Hungarian No 9, 1986 pp 409-413

[Article by Dr Terez Kormany, Budapest Technical University, and Laszlo Szeloczei and Sandor Reti, Microelectronics Enterprise: "Intrinsic Gettering in Si-Wafer Technology"]

[Excerpt] 3. Intrinsic Gettering Experiments

3.1 Characteristics of the Si Wafers Used

We performed technological experiments to determine the advantageous and disadvantageous consequences of intrinsic gettering. In the case of circuits formed on gettered wafers we studied the reduction in leakage current, making comparisons with the corresponding parameters of the circuits on an ungettered wafer. At the same time we checked the increase in wafer curvature as a result of intrinsic gettering on Si wafers with different thermic antecedents. Table 1 contains the characteristics of the wafers used in the studies.

Table 1. Characteristics of the Si Monocrystal Wafers Used in the Intrinsic Gettering Experiments

Si Crystal Series Designation	Type	Dopant	Specific Resistance Ohm cm	Thickness Microns	Orientation	$[O_i]$ 10^{17} Atom cm^{-3}	Crystal Faults
L22	n	p	4.5	390	111	7.6	(1)
L76N	n	p	1.8	457	100	5.9	"
L15C	n	p	6.6	395	111	8.3	"
05/27	n	p	3.7	510	100	6.2	"
30	n	p	3.2	508	100	8.0	"
A23	p	B	5.8	457	100	5.4	"
S2	p	B	3.9	457	100	10.4	"

(1) All crystals were dislocation free.

3.2 The Heat Cycle and Gas Atmosphere Used

In the course of preliminary experiments we found heat treatment done in a nitrogen atmosphere to be optimal--from the viewpoint of gettering efficiency--so we used this from then on. The sequence of heat treatments, based on the preliminary experiments, was 1100-800-1100 degrees Celsius, since

this made possible the development of a "denuded" zone of the desired thickness.

In the first high temperature step the oxygen diffuses into the air from the domains near the surface. This step is also a sort of homogenizing heat treatment, since the faults frozen into the wafers with different thermic antecedents melt out and in the course of cooling similar fault structures form in the wafers treated together.

The second, lower temperature heat treatment forms the microfaults, or in other words the precipitate dislocation foci, which trap the impurities which got into the wafer.

In the course of the third heat treatment, again at a high temperature, the precipitates which have formed already grow further and thus the gettering capability of the faults increases.

4. The Effect of Intrinsic Gettering on Wafer Curvature and Electric Parameters

4.1 Wafer Curvature

For our experiments studying change in curvature we selected from the Si wafers available those with the minimal possible curvature in the base state (see Figure 2). To measure curvature we used the Talystep equipment made by Taylor-Hobson. When measuring curvature we laid the the Si wafers on a ground glass disk. Setting the needle of the Talystep on the center of the wafer the thickness value obtained is the base level compared to which the thickness, when the wafer is moved later, deviates in a positive or negative direction depending on whether the wafer is concave or convex. We moved the wafer in a direction parallel to the flat and perpendicular to the flat. Then we put pressure onto the wafer from above, while the needle was in the center. Thus, as a result of the pressure, the wafer conformed to the glass sheet and the deviation of the Talystep showed the character of the curvature. We did the measurement on both sides of the wafer. When applying pressure one has to be careful that no air cushion remains between the wafer and the glass sheet since this would falsify the measurement. This can be easily avoided if the surface on which we lay the wafer is smooth but ribbed. Thus an air cushion cannot form for the air can pass from under the wafer unobstructed.

Comparing the profiles measured at the start and after the heat treatments we established that the magnitude of curvature increased for every single wafer--as was expected--but not to the same degree after the several heat treatment steps. According to the curvature measurements done after the first heat treatment, at 1100 degrees, the profiles generally changed little compared to the start; this deviation is of a magnitude which would not influence the photolithographic step. The mild curvature change is probably a result of the formation of precipitate, which has already begun.

In the course of the following low temperature heat treatment a large number of precipitate dislocation foci suitable for binding impurities developed, and the wafer curvature became significant also. In the course of the third heat treatment the size of the foci which had already formed increased and the final curvature developed (see Figure 3).

The curvature causing effect of the precipitates is interdependent with their size. These fault complexes are several microns in size; they arise in large numbers in the crystal lattice as a result of gettering and strain the lattice. This results in macroscopic changes, that is the deformation of the wafer. The magnitude of the change, especially if we compare it to the change in interstitial oxygen content (see Table 2), is not entirely unambiguous. The change (decrease) in interstitial oxygen content is known to be related to the degree of precipitation. The greatest degree of curvature induced by gettering did belong to the maximal decrease (e.g., with L15C), but with sample S2 the curvature hardly changed although the oxygen concentration decreased in a tangible way. This is interdependent with the fact that the thermic antecedents of the wafers were not uniform, and we did not take into consideration the substitution carbon concentrations.

Table 2. Interstitial Oxygen Concentration and Curvature Change as a Result of Intrinsic Gettering

Si Crystal Series Designation	Type	Orientation	O_i 10^{17} cm^{-3} Base State	After Intrinsic Gettering	Curvature microns Base State Up	Base State Down	After Intrinsic Gettering Up	After Intrinsic Gettering Down
L22	n	100	5.9	5.3	13	5	12.4	1
05/27	n	100	6.2	5.7	5	10	9	10.4
30	n	100	8.0	7.6	4	6	15	2.5
L15C	n	111	8.3	6.0	11	8	20	15
A23	p	100	5.4	5.3	2	14	12	12
S2	p	100	10.4	9.0	12	4	13	4

4.2 Leakage Current

In order to clarify the role of intrinsic gettering influencing the leakage current of pn junctions we prepared p channel MOS circuits with and without intrinsic gettering. In contrast to the curvature study, however, we performed the intrinsic gettering heat treatments in an O_2 stream--the sequence of temperatures was again 1100-800-1100 degrees Celsius--so that we could carry out the first step in producing the integrated circuits, growing the field oxide, together with the gettering. Measured with the Talystep the thickness of the oxide layer formed as a result of three step heat treatment was 490 nm, which corresponded to the field oxide of the so-called student p channel MOS technology, without gettering, used in the EET [Electronic Devices Faculty] laboratory of the BME [Budapest Technical University]. After the heat treatments, using wafers from the L76N series the substitution carbon concentration of which was 1.5×10^{16} cm^{-3}, we produced in parallel on gettered and ungettered wafers p-MOS integrated circuits which contained two four-input NOR gates and four MOS transistors. We did not perform breaking and encapsuation for we could measure the residual currents--the reverse currents of the substrate and diffusion area, as a diode--on the wafer.

We measured the residual currents at the Foti Street plant of the Microelectronics Enterprise on the measurement apparatus shown in Figure 4, with a 25 V bias voltage. Figure 5 shows the measurement results in the case of an ungettered wafer and Figure 6 shows them in the case of a gettered wafer. Every square in the figures depicts the magnitude of the residual current of one chip. We can establish from a comparison of the two residual current maps that the residual current values on a gettered wafer (Figure 6) are smaller by approximately an order of magnitude than on an ungettered wafer (Figure 5).

The development of O-precipatates in wafers which received the three-step heat treatment was proven by the decrease in the infrared spectroscopic measurement O_i concentration, from the initial 7.6 x $10^{17}cm^{-3}$ to 7.0 x $10^{17}cm^{-3}$ or from 8.4 x $10^{17}cm^{-3}$ to 6.3 x $10^{17}cm^{-3}$, and by the fault complexes identified after preferential etching on a perpendicular section of the wafers.

5. Evaluation of Results

It was proven in the course of our experiments that the three step, high-low-high, heat cycle intrinsic gettering technology selected by us can be used successfully in both n- and p-type Si monocrystals. The duration of the heat treatment in the first step can be varied over a relatively broad range according to the desired degree of oxygen diffusion, because the curvature increase is not yet of significant magnitude then. The subsequent heat treatment steps are critical and here we must strive for optimization (temperature, duration and atmosphere for foci generation or growth) so that there should be gettering foci of suitable number and size while wafer curvature remains under a well defined, critical value. If we solve this optimization task--clarifying the role of the substitution carbon concentration is part of this--then one can expect that use of intrinsic gettering may increase the yield of integrated circuit manufacture and that the electric parameters of the devices will improve. The data pertaining to the leakage current of the circuits studied support our assertion.

Biographic Notes

Dr Terez Kormany got her degree at the Lorand Eotvos Science University. Between 1958 and 1982 she worked at the Telecommunications Research Institute. Since 1982 she has been a lecturer at the Electronic Devices Faculty of the BME. She holds Tivadar Puskas, Pollak, Virag and MTESZ [Federation of Technical and Scientific Associations] prizes. She is a member of the presidium of the HTE [Communications Engineering Scientific Association], a member of the executive committee of the MTESZ and participates in the work of a number of MTESZ associations. Her research areas are study of electronic materials and microelectronic technology. She has worked as a guest researcher in Vienna at the Technical University, in Berlin and Stuttgart at the Max Planck Institute and in Novosibirsk at the Semiconductor Physics and Inorganic Chemistry institutes.

Laszlo Szeloczei obtained his degree in electrical engineering at the BME in 1984. Since September 1984 he has worked as a developmental engineer in the Element Development and Experimental Manufacture main department of the Microelectronics Enterprise while participating in 2-year day special engineer training at the Electronic Devices Faculty of the BME. He is a member of the HTE.

Sandor Reti obtained his degree in electrical engineering at the BME in 1984. Since September 1984 he has worked as a developmental engineer in the BOAK [equipment oriented circuits] department of the Microelectronics Enterprise. He is a member of the HTE.

FIGURE CAPTIONS AND KEYS

Figure 1. Sketch of the zones developing in Si monocrystal wafers as a result of intrinsic gettering. [From top to bottom the zones are: Devices, Denuded zone, Precipitates, and Denuded Zone.]

Figure 2. Curvature of Si monocrystal wafers in the base state. [The column headings from left to right are: Wafer identifier, Profile perpendicular to flat, Deviation under pressure (microns), and Profile parallel to flat. The down arrows indicate pressure on shiny side and the up arrows indicate pressure on the matt side.]

Figure 3. Curvature of Si monocrystal wafers after 3-step intrinsic gettering heat treatment. [Headings and notes as in Figure 2.]

Figure 4. Measurement apparatus used to measure residual current. [The elements are, top to bottom and left to right: Microscope, Dark chamber, Needle contact, Measurement table, Log. pA meter, Generators, and x-y Plotter.]

Figure 5. Residual current map of p-MOS IC prepared without intrinsic gettering.

Figure 6. Residual current map of p-MOS IC with intrinsic gettering.

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CSO: 2502/21

HUNGARIAN DEMAND FOR AND USE OF USER INTEGRATED CIRCUITS

Budapest HIRADASTECHNIKA in Hungarian No 9, 1986 pp 422-424

[Article by Tibor Somlai, Microelectronics Enterprise (MEV): "Domestic Demand for and Applications Problems With User Integrated Circuits"]

[Text] Summary
The article analyzes the limits of the domestic market for user integrated circuits and in connection with this provides new data on some structural characteristics--series size, unit price, structure according to ratio of new products--of the electronic equipment manufacturing industry. In addition the author points, on the one hand, to those problems of applications which coincide with international experiences and, on the other hand, to those which are interdependent with our unique economic environment system.

A number of domestic articles have already dealt with the international market for user integrated circuits, but the domestic market for this product is just now developing so it is understandable that there are fewer publications about this. In any case it can be established that the trade dynamic is more moderate than planned and, in our opinion, a relatively strong role in this can be attributed to the feebleness of demand, in addition to the investment difficulties and the deficiencies of supply. What we have here--as an exception--is limited domestic demand for a microelectronic part about the modernness of which there can be no doubt and for the adoption of which great efforts have been made within the framework of a government program, so it seems justified to study the magnitude of demand and the problems of applications.

We can divide the factors determining demand into three groups:

1. the limits of supply and technical factors,
2. the structure and developmental dynamic of the electronic equipment manufacturing industry, and
3. applications questions and problems.

In what follows we will emphasize point 2, and partly point 3, and only refer in passing to questions belonging to point 1, not so much because of their relative importance as for the sake of the new information which can be given.

1. The Limits of Supply, Technical Factors
We must regard it as a fundamental problem that in the past period users were being offered products--often not entirely matured ones--being made with manufacturing capacities still only half finished. It is to be hoped that the near future will bring swift and positive changes in this regard. There is also another aspect to the limits of supply and this is determined by the spectrum of technologies and products which can be obtained. In general users mention the following technical limitations in their applications aspirations: speed, voltage range, load capacity, consumption, and, more rarely, complexity and the combined performance of analog-digital functions.

2. The Structure and Developmental Dynamic of the Electronic Equipment Manufacturing Industry
Making use of user IC's is crucially influenced by, among other factors, the following characteristics of the equipment manufacturing industry:

a. manufacturing series sizes,
b. the rate at which new products are put into production,
c. the profile and unit price of products manufactured, and
d. the production dynamic and branch structure of equipment manufacture.

a. Electronic equipment marketed in small and medium series sizes provides a favorable soil for user IC applications on the capitalist world market. Naturally series sizes which are too low raise an obstacle to applications from the economic side.

Well, the annual manufacturing volumes of the Hungarian electronic equipment manufacturing industry show a distribution in the direction of these too low series sizes which, on the basis of international comparisons, makes probable an unfavorable trend in regard to domestic BOAK [equipment oriented circuits, also a copyrighted trade name for custom circuits] applications. For proof let us look at Table 1.a, which shows the structure of domestic electronic equipment manufacture for 1982 in a statistical aggregate such that the published production volumes give values higher than the actual ones.

Table 1.a. Structure of Electronic Equipment Manufacture According to Annual Manufacturing Volume of Product Groups (ITI [apparent typo for ITJ, Industrial Products Register]) in State Industry in 1982

Units Manufactured	Production Value (percent)	Unit Price (thousand forints)
1-100	18.2	1,098
101-500	16.2	331
501-10,000	37.9	46
10,000-	27.5	3
	100.0	12

We have stressed separately the similar indexes for the computer technology manufacturing branch which is especially important from the viewpoint of user IC applications (see Table 1.b).

Table 1.b. Structure of the Computer Technology Manufacturing Branch According to Annual Manufacturing Volume of the Product Groups in State Industry in 1982

Units Manufactured	Production Value (percent)	Unit Price (thousand forints)
1-100	33.3	3,129
101-500	16.4	372
501-10,000	50.3	94
	100.0	170

The tables strikingly reflect the low series sizes for equipment manufacture, for a volume smaller than 500 units, which can be regarded as minimal from the viewpoint of user IC applications, characterizes a minimum of 36 percent of production (or 50 percent of it according to estimates) and characterizes a minimum of 50 percent within computer technology (more likely 60-70 percent of it). This means that independent of any technical or other viewpoint this part of production in all probability does not represent demand for user IC's.

b. To the extent that equipment oriented IC's are built into a product the applications encourage a rethinking of design and manufacture, so the necessary developmental efforts, as a whole, will be equivalent to putting a new or modernized product into production according to domestic statistical usage. So from the viewpoint of the spread of user IC applications a determining factor is the innovative ability of the equipment manufacturing industry, and a possible index of this is the ratio of new and modernized products put into production annually.

Table 2. The Ratio in Regularly Manufactured Products of New or Modernized Products Nationally and of New Products at an Enterprise Put into Production in the Past Year (state industry, percent)

Category	1981	1982	1983
1. Communications engineering and vacuum technology	8.6	7.4	11.9
2. Instrument industry	6.9	9.5	13.5
3. Average of 1 and 2	8.1	8.1	12.5
4. Machine industry	7.8	7.8	9.3
5. State industry	4.0	4.5	3.9

According to Table 2 the ratio of new and modernized products in state industry as a whole has stagnated at a quite low value in the recent past. The similar characteristics for the machine industry and for the branches manufacturing electronic products therein show much better values, but the average of about 10 percent can be regarded as equivalent to only about half of the new product ratio to be found on the capitalist market. (It may give cause for some optimism that in the computer technology manufacturing branch, especially interesting from the viewpoint of user IC applications, we can find product replacement rates greater than 30-50 percent, according to research data.) The value of about 10 percent means that each year an average of one tenth of the products can be considered for use of custom IC's.

c. It can easily be seen that in the case of a certain percentage of electronic products the quantity of necessary electronic functions does not require or the unit price cannot bear the use of user IC's. The last column of Table 1.a gives the average unit price of the equipment. Knowing the detailed data it is probable that the above reason rules out use for 20 percent of the products, and in general these come precisely from the products manufactured in larger series.

d. An increase in production is certainly advantageous from the viewpoint of the user IC market, for it provides an opportunity for increased introduction of new products and for renewal of the product structure. Although the industrial policy conception for the Seventh 5-Year Plan and the electronics conception therein are still being worked out, and changes in external conditions could influence economic growth during the plan period, it is probable that we would not err greatly if we reckon with a 7-10 percent annual current price growth in the plan period. Compared to the 56-60 billion [forint] electronics production expected for 1985 this will bring a 1.4 to 1.6 fold increase by 1990 and result in a production of 85-100 billion.

Analyzing the branch and market trends for the expected development we can establish that while the computer technology, control technology and instrument industry branches may play a progressive role in use of user IC's, the telecommunications products within industrial communications engineering will have less need of user IC's--recognizing the present product offering. Unfortunately we must also say that the socialist market for electronic equipment will have less need for user IC applications, and will recognize them in the price less, than the domestic and especially the capitalist markets. In the light of this we can evaluate the development trends and their effects as meaning that out of the annual 7-10 percent production growth for equipment manufacture only 60-70 percent can be converted into potential demand for user IC's.

3. Applications Questions, Problems

On the basis of user experiences [Footnote: Research conducted within the framework of the OKKFT (National Medium-Range Research and Development Plan) in which the author participated also justified the previous assumptions and also provided a number of interesting new results.] a number of problems can be formulated in connection with domestic use of equipment oriented circuits; but at the same time positive phenomena can be observed as well. Some of the applications problems are akin to ones which can be found on capitalist markets as well:

--Many users are frightened away from use by the high developmental costs, for this requires from them not only material resources but also significant developmental capacity. In addition, they feel the expenditures to be most risky, with a long pay-off period. And the unwillingness is strenthened by the present general shortage of developmental money;

--The manufacturer-user link is the critical point in the market for user IC's; in the first place, in the developmental phase, confidential systems information must be communicated to an outside party, and in the second place,

in the manufacturing and marketing phase, the security of supply can cause problems. All these problems can be mitigated by ensuring alternative delivery sources and by hard, long-range work on the part of the manufacturer.

The other part of the applications problems is closely bound to unique aspects of our electronics industry, to the general economic environment:

--The relative backwardness of our equipment manufacturing industry is a first order problem; it holds back the efficient use of modern parts. Within this the "softness" of the socialist and domestic markets does not force modern solutions; the quota system and the low level of services acts as a brake on technical development trends which require flexible forms.

--The embargo, the chronic shortage of foreign exchange and the general shortage of parts which can be felt as a result tie up a large part of the energies of the equipment manufacturing industry and of its developmental-manufacturing staff. Not enough strength goes to developmental-analytical work on use of equipment oriented circuits, at present affecting less than one percent of domestic IC use.

--Interdependent with the softness of the domestic and socialist markets and with the deficiencies of our economic system is the fact that the cost sensitiveness of enterprises is small; accordingly the systems used to measure costs are not built up and do not function adequately. It also follows from this that developers take only little note of the costs of production. This causes a special problem from the viewpoint of using equipment oriented circuits because the economic advantage of building them in appears not primarily in comparison to the price of the parts replaced--indeed, typically the price of them is always higher--but rather in moderating the incidental costs (assembly, testing, servicing).

--Finally, we cannot ignore the effect of certain individual or group interests (patents) and subjective factors with which one must always reckon when a fundamentally new technical culture appears.

Fortunately the factors which encourage the spread of the use of equipment oriented circuits in our country are not insignificant either:

--We certainly must list here the results of the government program which appeared in the wake of the BOAK development-manufacture-education-diffusion efforts.

--The stressed development of the electronics branch and especially the forward movement of the manufacturing branches involving computer technology therein will certainly strengthen demand.

--As a result of the parts shortage and import uncertainty more than one producer sees in use of BOAK's a possibility of replacing import and desires to lay the foundations for more secure manufacture with their aid. Unfortunately this trend also has side effects; frequently the equipment manufacturers ask for BOAK's which reproduce existing catalog circuits--at the level and price of the catalog circuits.

--If in regard to the use of BOAK's we can speak of the subjective factors appearing we should also list the best traditions of the domestic technical intelligentsia. Carefulness, individual ambition and developmental spirit encourage many engineers to recognize new, modern solutions. Often just this is the chief source which carries applications to success.

Summary Observations

The interdependencies outlined above--especially in points 2 a through d--provide an opportunity for us to study domestic demand for user IC's in a more basic way, almost as a model (an earlier study [T. Somlai, "Equipment Oriented Circuits and the Hungarian Electronics Industry," an internal study of the MEV, May 1983] contains a detailed treatment of this modeling work). It is estimated that by 1990 there could be domestic user IC trade worth 60-80 million forints if the manufacturers, users and vendors strive with hard work to eliminate the deficiencies described. However, we consider that something more important than making more precise the estimated trade values is the information deriving from the analysis which shows which of the quantitative characteristics of the domestic equipment manufacturing industry might be changed to better influence the size of the user IC market. We feel that it can be easily seen that of the factors listed it is especially an acceleration of product replacement and an increase in production series sizes by virtue of which an increase in the general competitiveness of the electronics industry and a growth of the user IC market can be interpreted as mutually strengthening, positive processes.

Manuscript received 30 November 1985.

Biographic Note

Tibor Somlai obtained his degree in 1972 at the Electrical Engineering School of the Budapest Technical University. He worked at his first place of work until 1982, during which time it changed its name twice (OVK [National Leadership Training Center] SZAMTI, MUM [Ministry of Labor Affairs] SZAMTI and ABMH [State Wage and Labor Affairs Office] MUK). In a computer technology environment he dealt with leadership science, enterprise and state administrative informatics and labor economics questions. In 1976 he obtained an industrial engineer-economist degree. Since the fall of 1982 he has worked for the Government Commissioner for microelectronics and in this capacity he has dealt with various questions of the international and domestic microelectronics industry and user integrated circuits therein, primarily taking an economics approach.

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HUNGARIAN ENGINEERING PRIZES DISTRIBUTED

Budapest HIRADASTECHNIKA in Hungarian No 9, 1986 pp 427-428

[Text] The following persons were awarded the Tivadar Puskas Medal by the Presidium of the Communications Engineering Scientific Association (HTE):

Dr Andras Baranyi, candidate in technical sciences, member of the HTE Executive Committee and of the MTESZ [Federation of Technical and Scientific Associations] Science Policy Committee and chief of a scientific main department of the Telecommunications Research Institute. He deals with the development of telecommunications equipment. At present he guides development of artificial satellite communications equipment. He was awarded the bronze degree of the Labor Medal in 1985 for his professional activity. Between 1980 and 1985 he was secretary of the HTE and since 1983 has headed a column in the journal HIRADASTECHNIKA. His 70 publications have appeared in Hungarian and foreign languages.

Dr Istvan Bozsoki, leader of the Microwave Communications Engineering faculty of the Budapest Technical University and a candidate in technical sciences. He teaches the subjects radio receivers, microwave equipment and radio systems and microwave remote sensing. He does and guides research and development work on numerous procedures and devices in the areas of parametric amplifiers, radar, synchronized microwave oscillators and microwave remote sensing. More than ten university texts, 25-30 professional articles, 10-15 studies, a number of patents and innovations and the gold and silver degrees of the Medal for Service to the Homeland summarize the results of this work. He is a member of the National Committee of the URSI and a permanent delegate to the National Committee of the COSPAR. He is a member of the presidium and Executive Committee of the HTE.

Peter Kesselyak, participates in the development and standardization of weather resistance methods in the domestic work committee 50 of the IEC. He is a member of the domestic reliability committee 56 of the IEC TC. After 1970 he organized the reliability data collection and evaluation system for telephone exchanges manufactured by the BHG [Beloiannisz Communications Engineering Factory] and operated by the Post Office and he created a reliability databank. Since 1974 he has been involved in a ministerial experts' project on "reliability and weather resistance of products" and participated in the development of the OMFB [National Technical Development Committee] study

titled "Reliability of Large Electronic Equipment." He won second place in the 1983 National Microelectronics Competition with his study on the technical-commercial-legal infrastructure needed for domestic adoption of microelectronics. He has given lectures at international conferences on a number of occasions; about 30 of his publications have appeared, a number of them winning prizes. He is a member of the leadership of the BHG factory group and of the Weather Resistance and Design Special Committee of the HTE.

Dr Mrs Pal Kolonits, general secretary of the MEV [Microelectronics Enterprise] Factory Group of the HTE, a chief hybrid technologist for the MEV and a candidate in technical sciences. She has done significant research and development work in the area of domestic development of a hybrid thin film technology. Almost 50 publications and scientific papers contain the results of her scientific work. She has given a number of lectures at international technological conferences and a number of her papers have appeared in internationally recognized journals. She received a distributed Academy award for her scientific activity. She was awarded the silver degree of the Labor Medal in 1978 in recognition of her work. She has played a very active role in the HTE in organizing conferences connected with hybrid technology, in giving lectures and as one of the founding members in organizing the Hybrid Microelectronics Club.

Laszlo Kurti, director of the Tiszakecske Factory of REMIX. He has guided this plant since 1970. He participated in founding it, which means that he did pioneering work in an area with several centuries of agricultural traditions by bringing in electronic parts manufacturing technologies. Today, as a result of his activity, he leads a well operating potentiometer factory employing more than 500 workers. He has done much to enhance the intellectual background for this manufacturing culture by bringing in engineers and technicians and it is no small merit that for 15 years, in the course of the Kecskemet Parts Conferences of the HTE, he has seen fit to organize factory visits to the Tiszakecske REMIX. He had an active part in creating the Kecskemet regional organization of the HTE. He has been awarded a number of enterprise outstanding worker and social distinctions and the bronze degree of the Labor Medal.

Rezso Palmai began his work in the HTE as a founding member of the Power Industry Telecommunications Work Committee, the association representing power industry telecommunications. To this very day he has been one of our most active colleagues in the work of the work committee, which since then has developed into the Power Industry Telecommunications Special Department. Since its formation he has been secretary and then chairman of the special department. He participated to a significant degree in realization of the computerized process control which is indispensable for modern electric load distribution in the electric power industry. The modern base network telemechanical computerized data collection system of the power industry was built up under his leadership. Earlier he did outstanding work in building the special communications networks for the Electric Works. He has created a number of technical solutions protected by patents, thus aiding the beginning of domestic manufacture of devices.

Lajos Pato participated in the testing of the electronically controlled crossbar exchange developed as part of CEMA cooperation and in test operation at the Terez Exchange and in the development of the electronically controlled rural exchange at Balatonfured. As responsible theme officer he guided development of the ECR 41 rural terminal exchange, the 7DSCs rotary transit exchange and the ECR 43 wired program controlled rural terminal exchange. He received the title Outstanding Innovator for creation of the electronic controls for the CA 1002 crossbar large subexchange. He guided the introduction into manufacture of the quasi-electronic, TPV subexchanges. The chief achievement of his work as a main department chief was development of the electronic, TPV, field distribution subexchange family. He significantly aided the adoption of modern electronic technology at the BHG. As deputy director of the BHG Developmental Institute he strives for, among other things, the realization of a uniform view in the subexchange developments under way, expansion of the types and services of the EP family and the realization of a digital subexchange family. He received the gold degree of the Outstanding Inventor twice. A number of his articles have appeared in professional journals. He is a member of the leadership of the Telecommunications Special Department and of the presidium of the HTE.

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CSO: 2502/21

FINANCIAL PROVISION FOR, GOALS OF HUNGARIAN TELECOMMUNICATIONS

Budapest HIRADASTECHNIKA in Hungarian No 9, 1986 pp 425-427

[A speech given by Dr Laszlo Udvari, a group chief in the Producing Infrastructure and Construction Main Group of the National Plan Office, at the 19 March 1986 prize awarding session of the Communications Engineering Scientific Association (HIE)]

[Excerpt] It is characteristic of the telecommunications network that nearly one third of the telephone exchanges have been in operation for more than 30 years, that series manufacture of two thirds of the equipment ended 15-25 years ago and that links among communities are undeveloped. The number of localities connected to the long distance network totals 500. In more than 2,000 communities the telephone operates when the post office is open--not counting the assistance requesting stations. The number of people waiting for a telephone approaches 500,000.

Because of the situation which has developed in some branches of the producing infrastructure, including communications, vigorous selection was necessary in the interest of moderating the tensions when formulating the developmental possibilities for the Seventh 5-Year Plan--considering the possible 3 percent growth in producing infrastructure investments. Thus the plan ensures dynamic growth for water management, in the interest of protecting the surface and subsurface water reserves, for setting up an accumulation process for the reconstruction needs in the telecommunications network and for communications, in the interest of expanding the network. This priority could be ensured in part by an expansion of developmental possibilities and in part at the expense of the development of other producing infrastructure branches, transportation and commerce.

In development of the telecommunications network this priority means that investment expenditures will exceed those of the preceding plan period by at least 75 percent at comparable prices.

As far as we know today this prescription, totaling 29.4 billion forints at current prices, is well founded financially; the devices, equipment and construction capacity necessary for the development are ensured. The demands on the telecommunications network justify a development even more dynamic than this. Accordingly the national economic plan treats the development of the telecommunications network as open.

By bringing in the resources of enterprises, cooperatives and institutions interested in development of the telecommunications network, and bringing in the resources of the populace, and with investments financed by assuming domestic and foreign credit the prescription can be exceeded. According to preliminary calculations the total of developments which can be supported by the resources which can be brought in and by the industrial background could reach 36 billion forints, which is more than twice that of the preceding plan period at comparable prices.

The following factors determined the points emphasized in the development of telecommunications for the Seventh 5-Year Plan:

--the backward technical condition of the telecommunications network, the reconstruction needs which have piled up, and the limited capacity resulting from this;

--the dynamically increasing information transmission needs, increasing quality requirements and a general need for expansion of the network;

--the uneven geographic distribution of the network, the limits on the ability to make use of it.

The developmental priorities were determined accordingly:

--preserving and then improving the operability of the telephone network, stopping the piling up of reconstruction needs;

--expanding the telephone network, automation interdependent with reconstruction;

--from the viewpoint of the social-economic use and spread of electronics it is essential that there be a dynamic development of the digital data transmission network, which constitutes a part of the infrastructure for computer technology;

--expansion of the capacity of the base network providing links among localities, a network very largely overburdened, and geographic expansion of automation of the telephone network.

In accordance with the points of emphasis the nearly 30 billion forints available according to the lower limit prescription will be spent as follows: 22 billion to develop the telephone network, 2.5 billion to develop the telex and data transmission network, and 5.5 billion to develop the telecommunications base network. The developments will be realized primarily

on the domestic industrial base; more than 80 percent of the necessary equipment will be of domestic manufacture.

We considered non-ruble accounting import for devices which will not be available from domestic manufacture in the plan period. These are primarily exchanges for the digital data transmission network, some transmission technology systems and a few cable types and cable fittings. Discussions are taking place in the interest of financing the import with World Bank credit.

At the time of preparing the Seventh 5-Year Plan a replacement of technology at telephone exchanges probably will not be considered. Because of the COCOM ban we can count on purchasing licenses for stored program controlled digital telephone exchanges at the end of the plan period at the earliest; installation of these exchanges can be put at the beginning of the Eighth 5-Year Plan.

In this situation it was proposed at several forums that the network should not be developed on the present technological base, that we carry out only the most necessary maintenance of level investments and realize the reconstruction and expansion of the network at a modern technical level if it becomes available.

Despite the doubtless rationality of the proposal we decided, in agreement with the Hungarian Post Office, that we must continue development of the telephone network at the fastest possible pace with the tools presently available, without delay. The decision is the result of the constraining effect of several factors:

--Some of the equipment operating in the telephone network is so used up that replacing it cannot be postponed further. Technically the reconstruction can be solved economically only with a simultaneous expansion.

--The economic damage and social tensions deriving from the telephone shortage do not make possible another 5-8 year delay in development of the network.

--A significant part of the information needs do not yet require unconditional use of a digital network; the advantages deriving from this could still be only partially exploited.

But it continues to be a very essential question for the communications industry and for telecommunications that we get as soon as possible the technology which will make possible the manufacture and use of integrated service digital systems.

The development of the telephone network in the plan period will have basically a reconstruction character (the plan counts on a more vigorous expansion in the telex and data transmission network). The volume of reconstruction will increase more than two times and there will be a significant increase in the ratio of those investments which will increase the traffic handling ability of the network and do not result in capacity expansion. Thus, despite the 50 percent increase, calculated in real value, in finances prescribed for telephone development the number of telephones

connected to main exchanges will increase by only 20 percent compared to the base period and the increase in all connected phones (including the subexchange ones) will remain at the level of the Sixth 5-Year Plan--partly in the interest of reducing the unacceptably high ratio of extension phones to main phones.

Developmental possibilities exceeding the lower limit will serve expansion of the telephone network, to avoid a further increase in the social-economic tensions deriving from the telephone shortage.

In the plan period the telecommunications investments will be financed from several sources. Although telecommunications activity produces significant profit throughout the world, and here also, the domestic telecommunications network is not self-financing in regard to its developments. The basic reason for this is the need to replace fixed assets in the network which have, to a significant extent, been written off to zero. So, in addition to the Hungarian Post Office's own enterprise sources, a significant proportion of the financing of developments will come from nonrepayable budgetary support and central fund awards. This will come to 11 billion forints in the lower limit prescription. A sum of similar size will be represented by a source which will be generated, as the Hungarian Post Office's own source, as a result of regulation deviating from the normative. Thus the direct and indirect state moneys provided for the development of telecommunications will cover more than 50 percent of the sources needed for all development of the Post Office and of the telecommunications branch of the national economy in the Seventh 5-Year Plan.

The financial sources of managing organizations interested in the development of telecommunications and the financial sources of the populace will appear as a new element in financing developments in the Seventh 5-Year Plan. These will represent more than 10 percent in the 30 billion forint development version. A smaller portion of the outside sources will consist of nonrepayable transfer of developmental funds; a larger portion will consist of 7-10 year bonds connected with installation of telephones. The number of new phones which can be installed limits the sources which can be obtained in this so-called regional bond arrangement. So the financing of developments exceeding the lower limit will be solved with new types of outside sources, basically by assuming development credit or by issuing general bonds with higher interest. Foreign credit can also be considered.

During the Seventh 5-Year Plan we will take the first steps in eliminating the backwardness of the telecommunications network relative to our social-economic developmental level. According to the long-range development thinking the elimination of this backwardness can be regarded as a realistic goal for the turn of the century. This will not be a simple task; it will be necessary to assure an unchanged developmental dynamic in the telecommunications network in the eighth and ninth 5-year plans; the volume of investments must be doubled for each plan period.

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CSO: 2502/21

TRANSFORMATION OF HUNGARIAN ELEKTROMODUL INTO TRADING HOUSE

Budapest HIRADASTECHNIKA in Hungarian No 9, 1986 pp 420-421

[Article by Dr Gyorgy Jani, economic director of Elektromodul: "Theoretical Problems of Transforming Elektromodul into a Trading House and Thoughts Connected With the Practical Realization of It." Manuscript received 15 November 1985. The first two paragraphs are the Hungarian language summary.]

[Text] The article justifies the transformation of Elektromodul into a trading house on the basis of the domestic electronic parts supply situation. It formulates the goal of trading house operation and describes in detail the enterprise's practical ideas about activities and about the method for a gradual transformation into a trading house.

It states that the transformation does not mean creation of a new organization but rather a qualitative renewal of the activity performed by Elektromodul thus far, which the enterprise had to do to meet the market needs.

The problem of domestic production of and trade in electronic parts comes up ever more frequently for the great majority of the technical and economic experts of the electronics industry.

The central development program for electronic parts and subassemblies during the Sixth 5-Year Plan prescribed central support for the domestic development of parts production which was significant in absolute value but not considerable compared to the needs and this support was not entirely used due to the difficult convertible exchange situation of the country.

There will hardly be more central cover for the industrial ideas for the Seventh 5-Year Plan. In plain words, it would be an illusion for us to count on development of a very efficient, large-scale domestic parts producing base in the course of the next 5-10 years. At the same time, electronification is a requirement accepted and proposed by the government; that is, a continual and increasing supply of electronic parts must be provided for the domestic equipment manufacturers.

In our present economic circumstances we cannot base electronification exclusively on domestic production of parts; solving parts supply has become a key question.

Elektromodul has been active in this area for 17 years and in this time it has gathered much experience. Based on this experience we evaluate parts supply along the following general lines:

1. Domestic parts production is not capable--in quantity, composition of goods, modernness or quality--of perfectly satisfying the needs of the electronic equipment manufacturers and especially the needs of the country. On the basis of a realistic estimate of the possibilities of the present and near future we can also say that it will not be capable of solving this task within a foreseeable time.

2. The socialist partner countries--which have generally turned more than Hungary to electronic parts development by orders of magnitude--are also struggling with shortages and their demands regarding the exchange base are increasing, so we cannot build in an unlimited way on this market in our acquisitions. At the same time, in many cases the manufacture of the most modern parts which determine technical development has not begun, or is still "in its baby shoes."

3. In principle the capitalist market is capable of delivering all parts. But here also acquisitions must reckon with at least two restrictions, the supply of foreign exchange or the national economic balance and the increasing strictness of export limitations which can be felt in capitalist countries.

The Hungarian electronics industry must be supplied with electronic parts and subassemblies amidst these acquisition conditions. The present circumstances require a renewal from Elektromodul so that it can carry out its functions and contribute with its own commercial methods to improving parts supply and, in so far as it is able, to the development of parts production. For this reason we decided to base our developmental strategies for the Seventh 5-Year Plan on a gradual transformation into a trading house, accordingly modernizing our activity and thus trying--if by small steps--to partially make up, by using commercial, market methods, the shortage which will probably remain a lasting one due to the insufficient central support for electronic parts production.

Our enterprise has taken a number of measures in the course of past years in the interst of improving domestic electronic parts supply and by becoming a trading house we intend to create a new quality in domestic electronic parts trade. In addition to our traditional activity and in harmony with the expansion of our resources we intend gradually to revive more and more proven old methods and also to introduce more and more new methods of trade. We will strive for closer and more lively contact with our shippers and customers in order to participate to an increasing degree in organizing the production of marketable products.

In what follows we will give a summary picture of our goals and concrete ideas, with the observation that we do not regard our ideas as unchangeable and that in the course of practice we do not exclude a debate, re-examination and modification of our ideas.

The goal of the parts trading operation of Elektromodul as a trading house is to satisfy the needs of domestic electronic parts users ever more fully in suitable quantity, quality, delivery time limits and price.

Domestic supply will stand in the center of the activity of the trading house; its resources will be organized and grouped accordingly. Its outside economic contacts will be organized in such a way as to increase the quantity of parts available, to broaden the directly accessible parts assortment, to stabilize the parts shipping network and to strengthen the security of supply. It is our further express aspiration that an ever larger part of electronic parts reserves be concentrated at Elektromodul and be quickly accessible for all users.

In the interest of achieving the above goals we plan to carry out the following activities:

--In accordance with previous practice we will sign capacity securing contracts with the chief domestic parts manufacturers. Within this:

--we will cooperate in their materials supply and in solving their stockpiling and import problems;
--in accordance with our strength we will contribute to their developments or serve as middleman for foreign capital, possibly creating new parts producing capacity or expanding old capacity in a joint undertaking;
--we will regularly pass on to the parts producers the changes in the needs of domestic users;
--we will strengthen contacts with the partner foreign trade enterprises of socialist countries, and within this:

--we will increasingly exploit extra domestic production (commodity exchange base) created by accident or by series sizes in order to import extra electronic parts;
--we will gradually increase our reserves of parts from such sources, to about one and a half times, in order to bridge over problems in socialist delivery readiness so as to substantially improve accessibility;
--with supports for them we will bring the prices of parts of socialist origin into harmony with the lower capitalist import price level and we will guarantee the price level for 3-5 years;
--we will expand the volume and assortment of parts of socialist origin with cooperation and barter agreements.

--We will restore the modern service methods used earlier, gradually expanding their sphere and introducing new services, and within this:

--we will gradually extend the set service to products manufactured continuously in large series, according to agreements to be signed enterprise by enterprise;
--we will renovate the branch warehouse network;
--we will extend direct warehouse service to an ever expanding sphere of products figuring in the registry of the offered assortment;

--we will continue to build up our national contract network for small consumers and small users so as to relieve the burden on our central apparatus and be able to give better, more operational service to the large users;

--we will organize the creation of a common interest testing base by bringing in enterprises which have the more important measuring instruments;

--we will carry out our own machine acquisition, for the time being machines of smaller value, assigning them to producers, on a contract basis, for parts production purposes;

--we will act as middleman for loan-for-use receipts in the interest of expanding domestic production or increasing capitalist export;

--we will look for possibilities abroad for using domestic production capacity and will organize and act as middleman for these;

--we will expand the network in Hungary of the consignment warehouses of foreign firms, regularizing the physical-financial-authority conditions for them;

--we will expand trade in licenses and know-how, cooperating in the search for central sources for this purpose.

--In addition to the expanding trading house services we intend to gradually broaden the forms of production cooperation with both our delivering partners and receiving partners:

--by creating common service undertakings (measurement, testing, classification);

--by expanding, on the basis of joint interest, the parts producing capacity of equipment manufacturers (material, supply and commercial contributions to production of parts for commercial trade over and above their own needs);

--by creating joint undertakings for export purposes (in the form of cooperation in creating the conditions for equipment, materials and other import needed for export or in creating financial conditions);

--by signing production contracts, in the interest of improving domestic supply.

To a lesser degree we already carry out the activities listed.

We plan to carry out the transformation into a trading house continuously and gradually without disturbing our present functions.

The pace of expansion of the activities being realized within the framework of trading house work will depend on the extent to which we succeed in bringing in outside resources, but we will start on the path of the changes even if we cannot count on central material support.

Our enterprise resources are limited and under present national economic conditions the income remaining at our enterprise is not too high. Nevertheless we are using our funds in the interest of the trading house transformation. This, however, makes possible only slow progress in reaching our goals. For this reason we have initiated an acceleration of the trading house transformation with central assets because in our judgment this could contribute to significantly raising the quality level of all domestic electronic parts supply in a relatively short time and as a result of this the

central contribution would be quickly returned by virtue of better production results and the increase in profit taxes deriving from them.

Biographic Note

Dr Gyorgy Jani received his economics degree in 1970 in the foreign trade section of the Karl Marx Economic Sciences University. He has worked since then at his first place of work, Elektromodul. First he dealt with market research and analysis; after 4 years of foreign service he worked as chief of the Soviet Import Department of Elektromodul. Between 1981 and 1984 he led the economics main department of the enterprise; between December 1984 and February 1985 he was marketing and economics director and since then has been economic director of the enterprise. He concentrates his attention primarily on discovering problems in domestic electronic parts supply and working out and implementing possible solutions. In this capacity he is an active participant in the research work of the MHE [Hungarian Communications Engineering Association], the World Economy Research Institute and other institutions. He writes studies and professional articles about the practical tasks to be solved. He considers the problem of electronic parts supply to be the key question for all domestic electronification and that Elektromodul must undertake an initiative taking and implementing role in solving it.

8984
CSO: 2502/21

PROSPECT FOR BRAZILIAN COMPUTER TECHNOLOGY EXPORTS

Export Drive Begins

Rio de Janeiro DATA NEWS in Portuguese 25 Nov 86 p 14

[Text] The results are still meager, nor was too much to be expected considering that the model adopted by Brazil in the "informatics" area does not put a premium on exports. But, in any case, the national companies have already been infected by the exporting spirit.

Believing in the old story of creativity, the "Brazilian knack," and the most obvious factor of cheap labor, the businessmen are trusting in more promising results in a short term. The list of companies that are striving to go beyond the borders already includes a good number of names: Sid, Digirede, Itautec, Scopus, Racimec, Elebra, Moddata, Microdigital, Imares, Abc, Milmar, Biodata...

Moddata has already sold modems to the United States; Elebra Informatica, circuit boards; and Racimec has exported banking terminals to the Mexican Unisys. In the meantime, Sid and Digirede confirm their entry into the Argentine market, in the area of banking automation. By 1988, Sid will export 200 terminals to the Banco Del Sud, and Digirede, bank-note dispensers.

Sid's plans also include exports to Mexico, Venezuela, Colombia, and Ecuador. Digirede, in turn, is aggressively trying to open doors in Peru, Colombia, Portugal, Spain, Italy, and the United States.

The Special Secretariat for Informatics (SEI), for its part, observing that "Informatics" products amount to less than 2 percent of total exports, decided to convene a group of businessmen and government representatives for the purpose of coordinating an export strategy. The idea arose in May and does not appear to have gone beyond the initial enthusiasm.

In the meantime, the multinationals are taking care of the major portion of the exports of "informatics" products. Last year, IBM and Burroughs sold $170.7 million worth.

Advantages, Disadvantages Detailed

Rio de Janeiro DATA NEWS in Portuguese 25 Nov 86 pp 15-17

[Article by Fernando Pereira]

[Text] Rio de Janeiro--With a share in the Brazilian export schedule of less than 2 percent of the total products sold abroad, the manufacturers of "informatics" equipment are struggling against the country's lack of tradition in that market to establish themselves as suppliers. The contribution of the genuinely national companies is still small. Responsibility for filling the gap existing in that area falls to the multinationals--IBM and Unisys (former Burroughs)--which have factories in Brazil and, therefore, committed themselves to exporting most of their production.

Cheap labor and creativity--the famous "Brazilian knack"-- are the two biggest arguments of the national manufacturers. Along that line, Moddata sold modems to Citibank, Elebra Informatica exported circuit boards, and Racimec negotiated with Unisys of Mexico to supply banking terminals. The multinationals--IBM and Unisys--have the prestige of their trade marks and powerful marketing channels. But the exporting effort is infecting all companies in the sector and more promising and permanent results are awaited within a short time. In addition to the traditional markets of the United States and Argentina type, markets such as Cuba--where two trade missions comprised of [representatives] of "informatics" companies have already gone--are also being tried.

The Brazilian export schedule is not fed by hardware alone. The software houses have also been achieving some scores in that exporting effort, as is the case of the companies that specialized in Mumps. Medidata placed basic software with Nixdorf, which is now marketing it throughout the world, its commercial manager. Carlos Valim, revealed; and Biodata is concluding a distribution contract with American and British companies, through Biotrade, for the export of its basic software for multiuser PC's. The first sales may be made this very year and should be followed by exports of application software for hospitals and the financial area, Biodata's commercial director, Fernando Voght, announced.

According to information from the Bank of Brazil Foreign Trade Department (CACEX), up to August of last year, $112.1 million worth of "automatic data processing machines," that is, computers, had been exported. Last year, IBM and Burroughs sold $170.7 million worth, and in 1984, $164.7 million. Those figures do not show much variation owing to "trade-back" contracts: imports tied to exports.

In terms of unfinished products, that is, components, the national companies show a certain variation in their transactions: up to last August, $2.9 million worth of circuit boards had been exported. Last year, those exports amounted to $2.6 million, but in 1984, precisely when Elebra Informatica obtained contracts in the amount of $4.1 million, Brazil's share as an exporter of circuit boards rose to $5.3 million. (The following year, according to the CACEX data, Elebra's exports of circuit boards dropped).

CACEX believes that Brazil exports a limited range of "informatics" products. Central Processing Units (CPU's), electronic automatic regulators, magnetic disk units, and other magnetic units represent half of the total exported. Japan, the United States, Argentina, Australia, and Mexico are the principal buyer markets for Brazilian products. They are exports from a subsidiary to a subsidiary, components that are going to be integrated into systems that will be sold in those countries or exported to other countries. Outside of the two large multinational companies, the national companies do not have "an appreciable degree of technological maturity, marketing, and support to sell computer systems abroad," according to CACEX's analysis.

Just as there are few exportable products, the list of importers is also small. Last year, businessmen such as the president of Microlab, Antonio Didier Vianna, had taken for granted the conclusion of an export contract between Brazil and China. The visits were made, there were participations at fairs and at congresses. This month, Cobra was visited by an important Chinese executive, but so far no deal has been concluded. More recently, the same cycle of contacts was made in relation to Cuba. The figures are much more modest, but again the expectations are optimistic.

Argentina

Perhaps the most mature approach in foreign trade terms is the one being promoted between Brazil and Argentina. At the beginning, there was the bidding for the formation of joint-ventures for the production of specific items, such as 16-bit computers and for rendering services, such as maintenance of the Argentine installed park. Various Brazilian companies sent bids. Some of the bidding did not produce any contract but now business is moving ahead.

The software houses began later but the prospects are even better. Last week in Foz do Iguacu, Assespro, the Chamber of Commerce of Computer Services, and the Chamber of Computer Companies (the latter two are Argentine business groups) sponsored the first meeting of the Latin American Association of Informatics Services Companies (ALESI). Eduardo Gutierrez, Assespro director for the international area, believes that there are already products that can be exchanged between the two countries, but the greater objective is the formation of binational companies.

A first company is going to be formed with 60 percent Brazilian capital and 40 percent Argentine capital involving two computer centers from Belo Horizonte--Sicom and Engepel--and Datatech and Sistemas Logical of Argentina. Mauro Lambert, of Sicom, revealed that this company will be a computer center based on an IBM CPU mainframe, with headquarters in Buenos Aires, and should go into commercial operation in March or April of next year. The software programs that will be offered were conceived in Brazil.

Government Export Assistance

Rio de Janeiro DATA NEWS in Portuguese 25 Nov 86 pp 18-19

[Article by Mari-Angela Heredia]

[Text] Brasilia--Brazilian "informatics" policy is not directed toward exporting. The meager figures presented by the national industry during 1985 and the first quarter of this year (CACEX data) demonstrate the need for a more

aggressive strategy by the Brazilian companies to sell their products abroad. Observing that need, in May the Special Secretariat for Informatics directed the formation of a group that would coordinate exports, with the participation of associations such as Assespro, the Brazilian Association of Processes Control and Industrial Automation (ABCPAI), the Brazilian Association of Technical and Scientific Instruments and Systems (INSISTE). Invited were all the promotion agencies in Brazil that proposed to support the industry's projects and market surveys.

But it seems that the idea did not go beyond the initial enthusiasm. The associations that should have presented proposals on the products that the companies have to offer and on probable markets did not succeed in defining their objectives. Whereas, before the new management, SEI's international area was devoted more to trade promotion, under the direction of the New Republic, it began to deal more with research and cooperation in the scientific and technological area, relegating the industrial area to a secondary level.

Responsibility

Thus, Brazilian exports in the informatics area are left completely in the hands of the companies themselves, which define the commercial transaction when contacted by other countries. The mechanism of government promotion is limited to the program of foreign delegations visiting SUCESU's fairs, contacts with government agencies, seminars on exporting, and pamphlets.

Through the official calendar, the Foreign Ministry's department of international fairs arranges the inclusion of Brazilian companies in the event, facilitates the acquisition of currency to pay the expenses, and offers all logistic support. The initiative for participation belongs to the private sector. Through its 90 trade promotion posts abroad, the Foreign Ministry provides all of the infrastructure necessary for the Brazilian companies to publicize their products.

In the first quarter of this year, as has been occurring for several years, IBM of Brazil was the company that exported the most. Under the item "other CPU's," for example, it exported the equivalent of $9.158 million to 20 countries (more than $6 million to Japan alone). In the first quarter also, IBM exported magnetic disk units to 34 countries. The total transaction was valued at $4,044,732.

Another item much exported by IBM was printers. The Brazilian affiliate exported $1.982 million worth to 44 countries (for all of 1985, the total was $12.8 million); alphanumeric and graphics video terminals are other items much sold abroad by the company.

Burroughs Electronica Ltda appears in second place in the list of the largest exporters in the area. In this first quarter, the company exported CPU's to eight countries in the amount of almost $1 million. The company also has other items on its export schedule.

National

A good number of Brazilian companies appear on the export list, although modestly. Argentina has been the big market for these companies. Last year alone, for example, companies such as Milmar Industria e Comercio, ABC Digirede

Nordeste, Imares Comercio de Computadores, among others, exported something in the neighborhood of $149,000 worth. Microdigital exported microprocessor-based CPU's for a total of $1.617 million, and in the first quarter of this year, in the amount of $339,883.

Last year, Scopus exported processors to the United States in the amount of $41,207 and to Ecuador in the amount of $10,048. The figures are still low compared to those of the multinationals, but the strategy of sales abroad is in the hands of the national companies, which are striving to expand their market share.

U.S. Blocks Exports to USSR

Rio de Janeiro DATA NEWS in Portuguese 25 Nov 86 pp 20,22,21 [out of sequence]

[Article by Hiroshi Fujii]

[Text] Sao Paulo--Despite the difficulties and the almost complete lack of knowledge about how to approach the foreign market, the national industry is little by little making its presence felt in Latin America, with some "bold ventures" in Europe, the United States and Socialist countries. Early this month, two Brazilian companies--Sid and Digirede--confirmed participation in the Argentine market in the area of banking automation. Sid will supply a total of 200 cash and information terminals to the Banco Del Sud by 1988, on the basis of an industrial partnership with Cnl-Bull. Digirede will market bank-note dispensers, through Autorede, in a transaction that now depends only on bureaucratic formalities. That leaves Itautec.

In both cases, the products will be supplied as Original Equipment Manufacturer (OEM), with later transfer of their respective technologies, according to prerequisites established by the Buenos Aires government in its Resolution 44 of the local Ministry of Industry and Commerce. Like Brazil, Argentina is also beginning to adopt a policy intended to provide the country with know-how in the near future.

Offensive

As a matter of fact, these intentions inspired in the Informatics Law are the result of a combination of diplomatic actions carried out by both governments and which recently culminated in a bilateral agreement concluded between Presidents Jose Sarney and Raul Alfonsin. In some way, Sid and Digirede are beginning to worry other companies traditionally present in Latin American countries.

Sid has already made its first contacts with Mexico, Venezuela, Colombia, and Ecuador through its foreign affairs and export board. Candido Leonelli, who recently transferred from the marketing board to the international relations board, relates that Digirede is aggressively making inroads in Peru and Colombia. Digirede's plans are even more ambitious since the company diversified its product line; on 15 December, Leonelli will be in Europe for contacts with Portuguese, Spanish, and Italian companies. "We plan to produce the 8000 supermicro locally for general use at the same time that we attack Latin America in banking automation."

The Digirede director guarantees the competitiveness of its products. Comparative tests between the 8000 and IBM, NCR, Burroughs, Cromenco, and Altos machines revealed that that is possible in compatible Unix machines. Besides, with local assembly, competitiveness will be even greater in relation to the FOB [Free on Board] export price set by the competitors--about $10,000 for the CPU configuration with floppy and 5 mbyte disk."

Penetration in the so-called market niches--sometimes of no interest to the big manufacturers--"may make even the U.S. market feasible," says Leonelli. In the first place, because from the technological point of view, "the Americans are using Motorola 68010 and 68020 processors. They run Unix basic software--the same used here--with a big difference in our favor: the personalization of application software."

Another positive point would be the massive use in the U.S. market of Automatic Teller Machines (ATM's), capable of being replaced by Electronic Fund Transfer Terminals (TEF), "at much lower prices." The TEF's most important competitors are Tandem, Stratus, and IBM 88.

Candido Leonelli prefers to keep secret about the contacts being developed in the United States, but it is known that one of them is "a well-known bank in the Lakes Region." The company does not harbor any illusions about competing with the big corporations for big users, "but we are going to complement products with smaller suppliers, directing our market effort at the savings banks which use distributed processing," he said.

Like Sid, Digirede has also divided its negotiations with Argentina into two stages. In the first, it will supply Autorede with bank-note dispensing machines: later it will make the transfer of technology. For its part, Sid is awaiting a clearer definition on the part of the Argentine Government regarding access to tax incentives--exemption from the Volume Added Tax (IVA)--a sort of Merchandise Transfer Tax (ICM). At the beginning of the activity, this tax will not be collected, but will be applied gradually in the course of the development of the activity.

According to a survey done by Digirede, the dollar potential market in Argentina is estimated at $2 million; in Colombia, $1 million; and in Peru, $300,000, for next year alone. The company should "sell the TEF for $500 per unit; the average automation of a banking branch for $40,000; and provide the user with an 8000 system for $20,000." Supplied as OEM, Digirede already sells the bank-note dispenser to Autorede for $1,300 for a final product that reaches the end user for $9,000.

The Sid Division will supply its 1200 Me and 1403 terminals for connections with the concentrator supplied by Bull for an undisclosed overall figure. The system will automate 41 branches of the Banco Del Sud with an average of seven cash terminals per branch, two terminals of which will be devoted to customer consultation and backup. Sid will also provide training, maintenance, and the necessary personalized software.

Itautec is also seeking to sell its equipment abroad through Itron. In addition to Argentina, the manufacturer is already conducting negotiations with Portugal, but its most recent endeavor is to work another big lode: the

Soviet Union. The Socialist Bloc also includes Cuba and China, although in that case the difficulties may be difficult to overcome. Simply knowing their needs is not enough, but mainly succeeding in overcoming the commitment not to pass on products imported from the United States to "nonauthorized markets."

Sacrificial Lamb

Serving as a sort of sacrificial lamb, Itautec failed to obtain authorization--at least for the time being--from the U. S. Department of Commerce to export PC's to Moscow. It is known that in this case the demand is for at least 100,000 micros--equivalent to $300 million. The company actually received the green light to export its products at the Soviet fair held in October but desisted in view of the impossibility of finally selling its product. The fact is that the company does not have great pretensions regarding the Soviet demand. According to Conrado Venturini, director of strategic programs, the national industry's capacity to meet demand in the PC area is still far short of what is desirable. "In 3 years of production, the number of national clones is only now approaching 30,000 machines--not even one-third of Soviet needs. We--Itautec--are producing around 800 machines per month, for an installed capacity of 2,000," Venturini said.

Cooperation With Argentina

Rio de Janeiro DATA NEWS in Portuguese 25 Nov 86 p 23

[Article by Hiroshii Fujii]

[Text] Sao Paulo--Carlos Rocha, the director of Tda and the architect of a plan of partnerships between Argentine and Brazilian industries for the joint production of "informatics" goods--observing the principles of Law No 7,232 of the Latin American Integration Association (ALADI) and the General Agreement on Tariffs and Trade (GATT)--will return to that subject soon during a seminar in Argentina sponsored by the Brazil-Argentina Chamber of Commerce and the newspaper GAZETA MERCANTIL.

In his opinion, if Brazilian and Argentine markets were added together, they would give the products greater competitiveness and flexibility, and permit raising the scale of production. In this case, the provisions of the Informatics Law would be applicable in the two countries, with equipment produced in Argentina being exported to Brazil under incentives and vice-versa.

The recent favorable conclusion of negotiations between Sid and Bull on banking automation already represents an important step. "We won the competition in a niche of the market in which we demonstrated competence equal to that of companies such as IBM and Burroughs," said Ary Handler, Sid's director of international relations.

Specialization by niches explains "why we won," according to Handler, in a Latin America that still imports almost 80 percent of its informatics goods from the United States and Canada. That situation is also revealed in a study conducted by ALADI. Of its 11 member-countries, only six have some type of "informatics" policy.

ALADI's study reveals also that as of 1984 the United States and Canada held 78.5 percent of the market; Europe, 11 percent; Japan, 5.5 percent; while Latin American industry held only the remaining 5 percent of the total. The same survey indicates that 2 years ago, the Brazilian installed park totaled 155,000 pieces of equipment; Argentina, 43,000; Mexico, 10,000 and Colombia, 8,700.

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CSO: 3699/52

BRAZIL TO HOLD HIGH TECH EXHIBITION IN HAVANA

PY191104 Brasilia Domestic Service in Portuguese 2200 GMT 18 Feb 87

[Text] Another step has been taken concerning the development of the trade relations between Brazil and Cuba.

[Begin relay] Nearly 20 Brazilian businessmen met with the director of the Havana Convention Hall, Mario (Zori), to plan the first exhibition of Brazilian products and services in the Cuban capital on 18-22 May. With the support of the Brazilian Association of Commercial Exporters, the Chamber of Foreign Trade Federation, the Cuban Chamber of Commerce, and the Cuban Foreign Trade Ministry the fair will exhibit Brazilian products and services the Cuban Government might want to import. Joao Augusto de Souza, president of the Chamber of Foreign Trade Federation, who participated in these meetings, described the products and services that dare to be exhibited.

[Begin Souza recording] Perhaps [words indistinct] high-technology finished products and computer services are the fields which we can exhibit to our Cuban friends. [end recording]

The exhibition will occupy 3,000-square meters of the Havana Convention Hall. According to the Havana Convention Hall director, Mario (Zori), the Cuban Government considers the exhibition as the most important in 1987. [end relay]

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